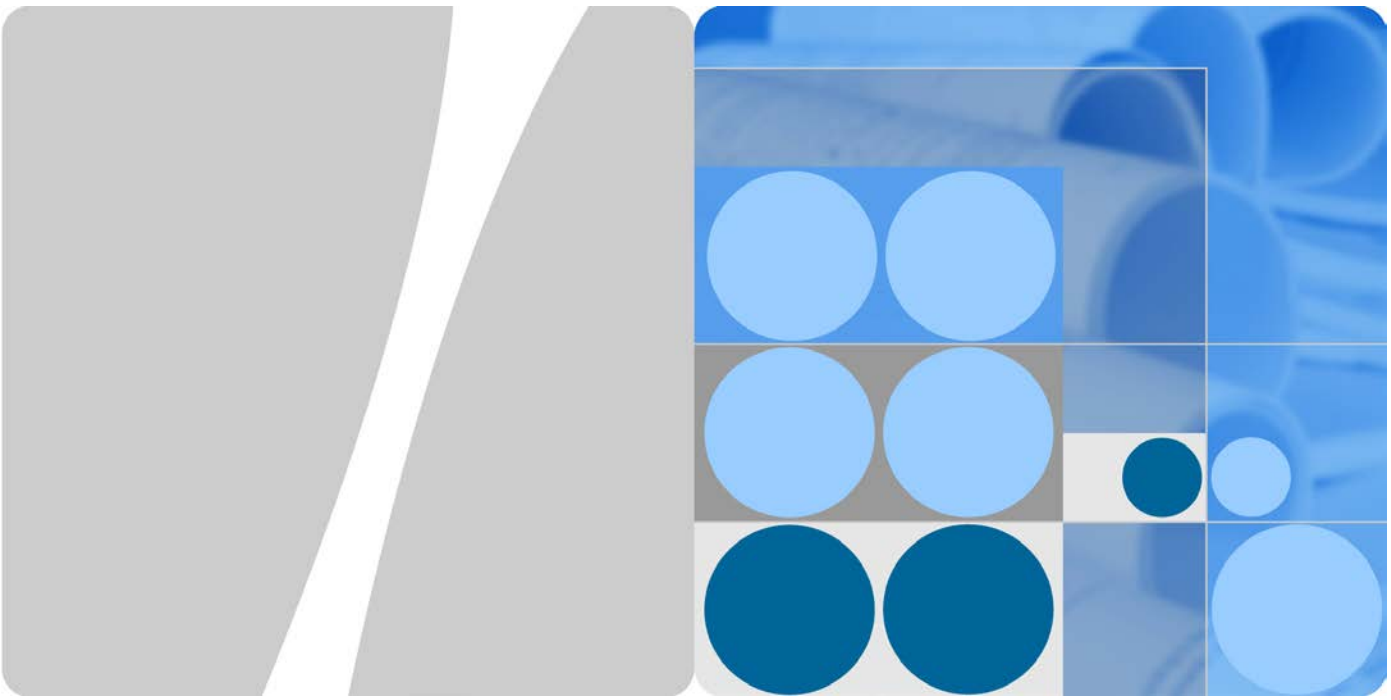


3900 Series Base Station

Product Description

Issue	15
Date	2018-03-31

HUAWEI TECHNOLOGIES CO., LTD.

Trademarks and Permissions


and other Huawei trademarks are trademarks of Huawei Technologies Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: http://www.huawei.com

Email: support@huawei.com

Contents

1 Introduction

1.1 Overview

To keep abreast of rapidly advancing mobile communication technologies, mobile operators are continually seeking partners who provide cutting-edge technologies to set up high-quality, multimode-enabled, and future-oriented mobile networks efficiently and cost-effectively.

With this in mind, Huawei launched 3900 series base stations, which are designed based on a high-performance platform and use an optimized hardware and software architecture. These base stations can work in multiple modes due to the integration of multiple cutting-edge technologies. They also have broad bandwidth and are eco-friendly and easily upgradeable.

Specially, 3900 series base stations use newly developed power amplifies (PAs), provide the temperature control function, and employ innovative power saving technology. This allows operators to build an eco-friendly network by saving energy, reducing emission, and using new energy.

These merits enable operators to mitigate investment risks, as well as set up high-quality, multimode-enabled, and future-oriented mobile networks.

Different types of 3900 series base stations can be delivered on request because the newly designed modules and auxiliary devices can be flexibly combined and configured. Figure 1-1 shows different types of 3900 series base stations.

Figure 1-1 3900 series base station types

NOTE

This document focuses on the BTS3900, BTS3900A, BTS3900L, BTS3900AL, BTS3900C, and DBS3900 only. For the descriptions of the other types of 3900 series base stations, see the product description for the base station in question.

1.2 Benefits

3900 series base stations are adaptive to various installation scenarios, because these base stations adopt the industry-leading modular design and support multiple radio access technologies (RATs). This greatly reduces operators' costs in site acquisition, capacity expansion, and environmental protection during network deployment and operation.

Smooth Evolution

3900 series base stations enable easy evolution from GSM to UMTS or LTE, and from UMTS to LTE, because of the following factors:

- In SRAN7.0 or earlier versions, a BBU3900 supports a maximum of two RATs and a three-RAT application is achieved using two BBU3900s. To support two RATs, one BBU3900 is equipped with multiple boards, among which some work in one RAT and the others work in the other RAT.
- In SRAN8.0, GSM, UMTS, and LTE can share one BBU3900.
- In SRAN12.1, NB-IoT is supported.
- Radio Frequency (RF) modules can work in multimode scenarios by using software-defined radio (SDR) technology. Dual-mode RF modules and single-RAT RF modules can be installed in the same cabinet for multimode and multi-band applications.

Energy-Efficient and Eco-Friendly

Innovative power amplifiers (PAs) and power consumption management help save energy and space in equipment rooms. The following features also help save energy, reduce emissions, and construct an eco-friendly network:

- RF channels are blocked and PA voltage is adjusted if the downlink load reaches a preset threshold.
- The power supply unit (PSU) is intelligently turned off based on the actual power consumption of the base station.
- The intelligent fan system controls the board temperature. Outdoor cabinets use direct ventilation, and RRUs adopt natural heat dissipation.

Low CAPEX

3900 series base stations reduce the following investments:

- Capital expenditure (CAPEX) for devices
  - Only one set of multimode devices is used to support multimode applications and easy evolutions from GSM to UMTS and further to LTE.
  - Various types of RF modules are introduced to meet diverse needs, for example, software-defined radio (SDR) RF modules that support antenna-sharing, dual-transmitter RF modules that support the multiple-input multiple-output (MIMO) technology, and single-transmitter RF modules with high power and large capacity.
  - An external reference clock and transmission resources are shared across RATs on a 3900 series base station.
  - The GU or GL refarming feature is introduced to save the CAPEX for evolution from GSM to UMTS or LTE.
- CAPEX for operation and maintenance (OM)

- The OM costs are reduced, because only one set of devices is required to achieve multimode applications and easy evolutions from GSM to UMTS and further to LTE.
- The number of required OM personnel is also reduced because of easy deployment, maintenance, and capacity expansion.

High Reliability

The following features are introduced to ensure high reliability:

- Support for the Huawei SingleBTS platform
- Support for co-radio resource management (Co-RRM), co-transmission resource management (Co-TRM), co-operation and management (Co-OAM), and co-radio network plan & radio network optimization (Co-RNP&RNO)
- Support for route backup. Routes can be switched over to protect high-priority service data.
- Support for the backup of important boards and power modules

2 Hardware Architecture

2.1 Base Station Types

3900 series base stations are classified into macro and LampSite base stations, which can be quickly and cost-effectively deployed in various scenarios to meet different customer requirements.

Based on application scenarios, macro base stations are classified into indoor separated base stations (BTS3900, BTS3900L, BTS3900A, and BTS3900AL), outdoor micro base stations (BTS3900C) and distributed base stations (DBS3900). Different types of base stations vary in function modules and cabinets. The following table lists the function modules and cabinets applicable to each type of base stations.

Table 2-1 Base station types

Product Form	Classification	Type	Function Module	Cabinet
Macro base stations	Separated base stations (indoor)	BTS3900	BBU+RFU	BTS3900 (Ver.D) and IMS06
		BTS3900L	BBU+RFU	BTS3900L (Ver.D) and IMS06
	Separated base stations (outdoor)	BTS3900A	BBU+RFU	Power cabinets (AC): APM30H series Power cabinets (DC): TMC11H series Transmission cabinets: TMC11H series Radio frequency cabinets: RFC series Battery cabinets: IBBS200D/IBBS200T series
		BTS3900AL	BBU+RFU	Power cabinet: BTS3900AL (Ver.A) Transmission cabinet: TMC11H (Ver.D) Battery cabinets: IBBS700D/IBBS700T and IBBS300D/IBBS300T
	Outdoor micro base	BTS3900C	BBU+RRU	OMB (Ver.C)

Product Form	Classification	Type	Function Module	Cabinet
	stations			
	Distributed base stations	DBS3900	BBU+RRU, BBU+AAU	Power cabinets (AC): APM30H series, OMB (Ver.C), IMB series, and TP48600A-H17B1 (referred to as TP48600A) Power cabinets (DC): TMC11H series, IMB series, and ILC29 (Ver.E) Transmission cabinets: TMC11H series Battery cabinets: IBBS20D, IBBS200D/IBBS200T series, IBBS300D/IBBS300T, and IBBS700D/IBBS700T Auxiliary equipment: open racks and OPS06s
Lamp Site base stations	N/A	DBS3900 LampSite	BBU+RHUB+pRRU	This type of base stations has the same BBU cabinets as a DBS3900.

NOTE

This document focuses on macro base stations only. For details on the other base stations, see the product description of the base station in question.

Huawei also provides the macro+distributed base station and the Cloud BB solution.

- Macro+distributed base station: A macro base station (namely separated base station) and a distributed base station are co-located. This solution enables flexible networking, which is more adaptive and provides stronger capability of capacity expansion and evolution. For details on the equipment information of a macro+distributed base station, see 2.9 Macro+Distributed Base Station.
- Cloud BB solution: On a Cloud BB network, cells served by different base stations can be coordinated. For details on the equipment information of a Cloud BB network, see 2.10 Cloud BB.

2.2 Function Modules

3900 series base stations adopt the modular design and consist of two function modules: BBUs and RF modules. The RF modules include radio frequency units (RFUs), remote radio units (RRUs), and active antenna units (AAUs). BBUs and RF modules are connected using electrical or optical cables through common public radio interface (CPRI) ports to transmit CPRI signals.

2.2.1 BBU

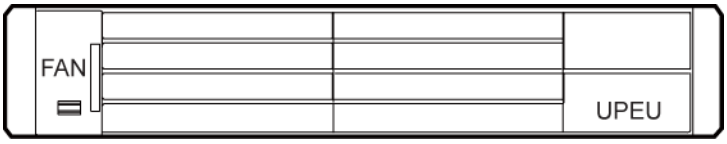
The BBU is a baseband unit and centrally manages the entire base station. The BBU provides the following functions:

- Manages the entire base station system in terms of OM, signal processing, and system clock.
- Provides physical ports for information exchange between the base station and the transport network.
- Provides an OM channel between the base station and the operation and maintenance center (OMC).
- Processes uplink and downlink baseband signals, and provides CPRI ports for communication with RF modules.
- Provides ports for receiving and transmitting signals from environment monitoring devices.

BBUs are classified into four types: BBU3900, BBU3910, BBU3910A, and BBU3910C.

With a case structure, the BBU3900 and BBU3910 can house different types of boards and modules. Figure 2-1 shows the exterior of a BBU3900 or BBU3910.

Figure 2-1 Exterior of a BBU3900 or BBU3910



The BBU3910A and BBU3910C integrate the functions of main control, transmission, and baseband processing all into one module. They are characterized by the small size and easy deployment. Figure 2-2 shows the BBU3910A exterior. Figure 2-3 shows the BBU3910C exterior.

Figure 2-2 BBU3910A exterior

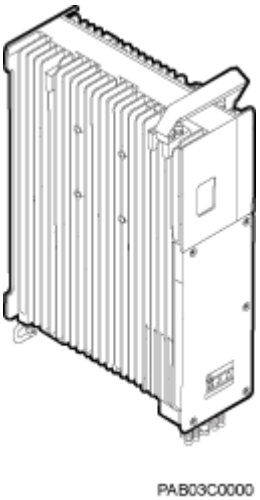
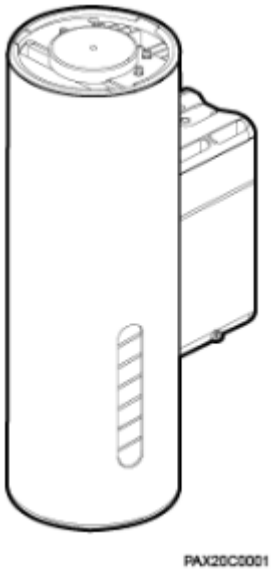


Figure 2-3 BBU3910C exterior



NOTE
For the specifications of each type of BBUs, see the description of the BBU in question.

2.2.2 RFU

As an RF module in a separated macro base station, the RFU modulates and demodulates baseband and RF signals, processes data, amplifies power, and conducts voltage standing wave ratio (VSWR) detection. RFUs are installed inside the cabinet.

Figure 2-4 shows the RFU exterior.

Figure 2-4 RFU exterior (using the MRFUd as an example)

NOTE

- For the specifications of each type of RFU, see the description of the RFU in question.
- The GRFU, MRFU, MRFUd, MRFUe, WRFU, WRFUa, WRFUd, WRFUe, CRFUd, and LRFUe modules have the same exterior but can be identified through silkscreens.
- The MRFUd, MRFUe, CRFUd, WRFUd, and WRFUe can be used only in a BTS3900 (Ver.C), BTS3900 (Ver.D), BTS3900L (Ver.C), BTS3900L (Ver.D), BTS3900A (Ver.C), BTS3900A (Ver.D), BTS3900A (Ver.E), or BTS3900AL (Ver.A) cabinet. The other types of RFU modules can be used in any cabinets.

2.2.3 RRU

As an RF module in a distributed base station, the RRU performs the following functions:

- Modulates and demodulates baseband and RF signals
- Processes data
- Combines and divides baseband or RF signals

RRUs can be installed on a pole, wall, or stand. They can also be installed nearby antennas to shorten the feeder length, reduce signal losses, and improve system coverage.

Figure 2-5 shows the RRU exterior.

Figure 2-5 RRU exterior (using the blade RRU as an example)

NOTE

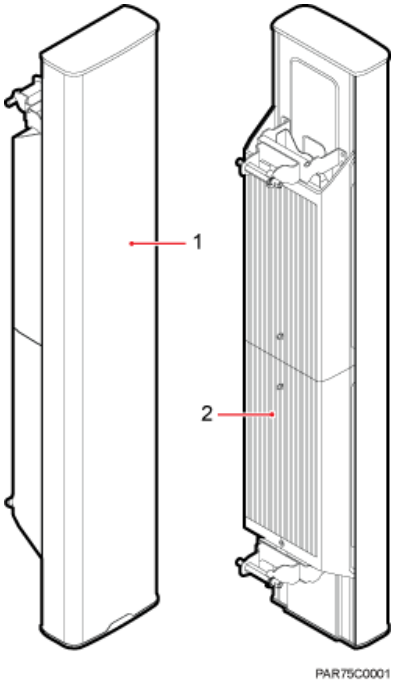
- It is recommended that the RRU3229, RRU3841, RRU3929, RRU3829, RRU3942, and RRU3961 connect to the APM30H (Ver.C), APM30H (Ver.D), TMC11H (Ver.C), or TMC11H (Ver.D) cabinet. If any of these RRUs connects APM30H (Ver.B) or TMC11H (Ver.B) cabinet, devices in the cabinet must be reconstructed. The other types of RRUs can connect to any cabinet.
- For the specifications of each type of BBU, see the description of the RRU in question.

2.2.4 AAU

As a new type of RF module, the AAU connects to baseband processing boards using CPRI ports and incorporates the functions of RF modules and antennas, which simplifies site deployment. The AAU can be installed on a pole or wall.

The following figure shows the AAU appearance.

Figure 2-6 AAU appearance (using the AAU3911 as an example)



(1) Front	(2) Rear

NOTE
For the specifications and parameters of each type of AAU, see the description of the AAU in question.

2.3 BTS3900

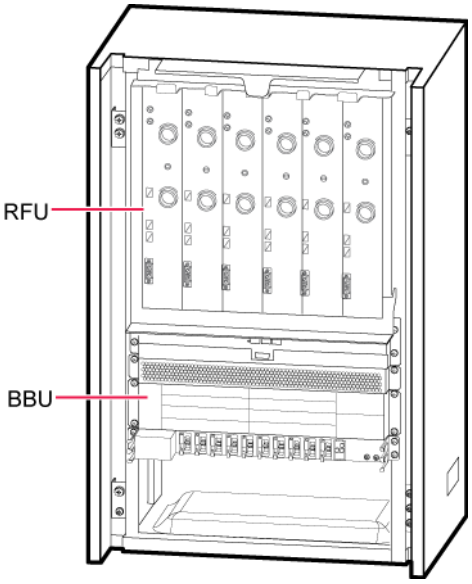
Indoor macro BTS3900 base stations use BTS3900 (Ver.D) cabinets and IMS06 cabinets (IMS06 refers to indoor mini subrack of 6 U height).

2.3.1 Cabinet

BTS3900 (Ver.D) cabinets feature large capacity, small size, and easy capacity expansion. This type of cabinets can be supplied with either AC power or -48 V DC power.

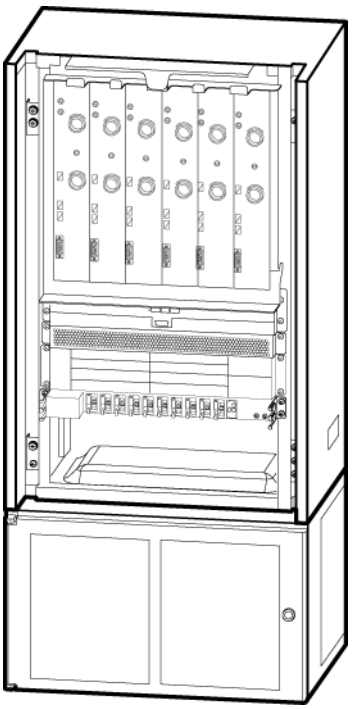
Figure 2-7 shows the internal structure of a BTS3900 (Ver.D) cabinet with -48 V DC power input.

Figure 2-7 BTS3900 (Ver.D) cabinet with -48 V DC power input



The BTS3900 (Ver.D) cabinet with AC power input can be stacked on an IMS06. Figure 2-8 shows a BTS33900 (Ver.D) cabinet with AC power input.

Figure 2-8 BTS3900 (Ver.D) cabinet with AC power input



2.3.2 Typical Configuration

Table 2-2 lists the typical configurations of a single-RAT BTS3900 (Ver.D) cabinet.

Table 2-2 Typical configurations of a single-RAT BTS3900 (Ver.D) cabinet

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 DRFU modules	20 W (900 MHz) or 18 W (1800 MHz)
	S12/12/12	6 GRFU modules	12 W
	S12/12/12	6 MRFU modules	12 W
	S12/12/12	6 MRFUe modules	20 W
	S8/8/8 + S8/8/8	3 MRFUd + 3 MRFUd modules	20 W (900 MHz) + 20 W (1800 MHz)
UMTS	3 x 4	3 WRFU modules	20 W
	3 x 4 (MIMO)	3 WRFUd modules	30 W (2 x 15 W)
	3 x 4	3 MRFU modules	20 W
	3 x 4 (MIMO)	3 MRFUd modules	40 W (2 x 20 W)
LTE	3 x 20 MHz (MIMO)	6 MRFU or 3 MRFUd modules	80 W (2 x 40 W) or 120 W (2 x 60 W)

NOTE
These configurations assume that each cell uses one dual-polarized antenna.

Table 2-3 lists the typical configurations of a dual-mode BTS3900 (Ver.D) cabinet.

Table 2-3 Typical configurations of a dual-mode BTS3900 (Ver.D) cabinet

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GU	GSM S4/4/4 + UMTS 3 x 2	3 MRFUd modules	20 W + 40 W
GL	GSM S8/8/8 + LTE 3 x 20 MHZ (MIMO)	3 MRFUd (GO) + 3 MRFUd (LO) modules	20 W + 80 W (2 x 40 W)
UL	UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (MIMO)	3 MRFUd (UO) + 3 MRFUd (LO) modules	80 W (2 x 40 W) + 120 W (2 x 60 W)

NOTE
- These configurations assume that each cell uses one dual-polarized antenna.
- GU indicates that GSM and UMTS share one BBU.
- GL indicates that GSM and LTE share one BBU.
- UL indicates that UMTS and LTE share one BBU.

2.4 BTS3900L

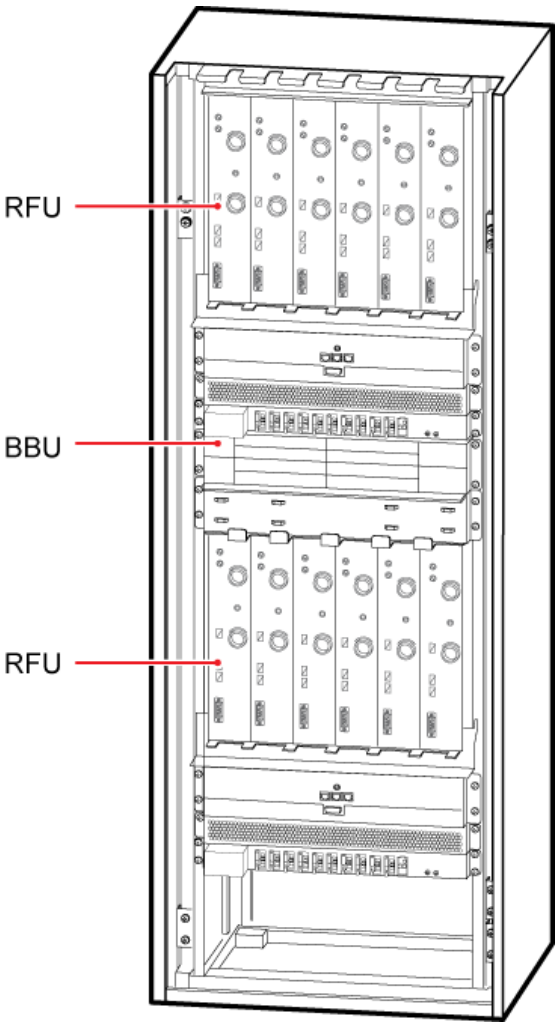
Indoor macro BTS3900L base stations use BTS3900L (Ver.D) cabinets and IMS06 cabinets.

2.4.1 Cabinet

BTS3900L (Ver.D) cabinets house BBUs and RFUs and provide the power distribution and surge protection functions. A BTS3900L cabinet houses a maximum of 12 RFUs and 2 BBUs. This improves the integration of indoor sites, saves installation space, and facilitates smooth evolution.

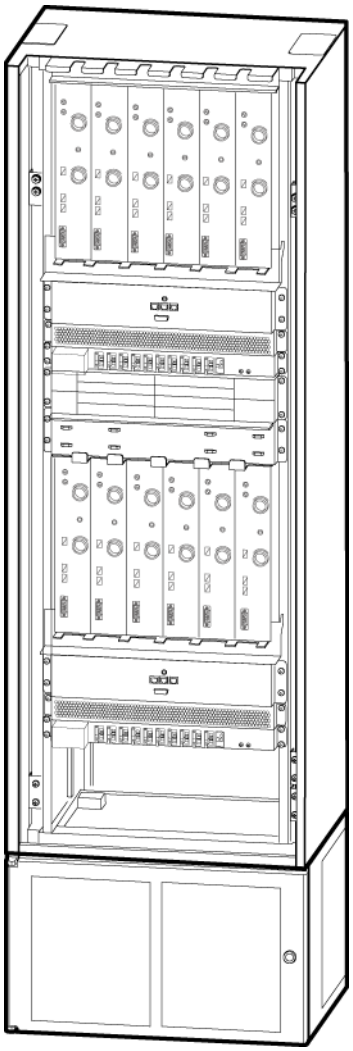
BTS3900L (Ver.D) cabinets can be supplied with either AC power or -48 V DC. Figure 2-9 shows the internal structure of a BTS3900L (Ver.D) cabinet with -48 V DC power input.

Figure 2-9 BTS3900L (Ver.D) cabinet with -48 V DC power input



The BTS3900L (Ver.D) cabinet with AC power input can be stacked on an IMS06, as shown in Figure 2-10.

Figure 2-10 BTS3900L (Ver.D) cabinet with AC power input



2.4.2 Typical Configuration

Table 2-4 lists the typical configurations of a single-RAT BTS3900L cabinet.

Table 2-4 Typical configurations of a single-RAT BTS3900L cabinet

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 DRFU modules	20 W (900 MHz) or 18 W (1800 MHz)
	S12/12/12	6 GRFU modules	12 W
	S12/12/12	6 MRFU modules	12 W
	S12/12/12	6 MRFUe modules	20 W
	S8/8/8 + S8/8/8	3 MRFUd + 3	20 W (900 MHz) +

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
		MRFUd modules	20 W (1800 MHz)
UMTS	3 x 4	3 WRFU modules	20 W
	3 x 4 (MIMO)	3 WRFUd modules	30 W (2 x 15 W)
	3 x 4	3 MRFU modules	20 W
	3 x 4 (MIMO)	3 MRFUd modules	40 W (2 x 20 W)
LTE	3 x 20 MHz (MIMO)	6 MRFU or 3 MRFUd modules	80 W (2 x 40 W) or 120 W (2 x 60 W)

NOTE
These configurations assume that each cell uses one dual-polarized antenna.

The BTS3900L is mainly used in multi-band and multimode scenarios. Table 2-5 lists the typical configurations of a multimode BTS3900L cabinet.

Table 2-5 Typical configurations of a multimode BTS3900L cabinet

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GU	GSM S8/8/8 + UMTS 3 x 2 (MIMO)	6 GRFU + 6 WRFU modules	20 W + 80 W (2 x 40 W)
		3 MRFUd (GO) + 3 MRFUd (UO) modules	
GL	GSM S8/8/8 + LTE 3 x 20 MHz (MIMO)	6 GRFU + 6 MRFU (LO) modules	20 W + 80 W (2 x 40 W)
		3 MRFUd (GO) + 3 MRFUd (LO) modules	20 W + 120 W (2 x 60 W)
UL	UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (MIMO)	6 WRFU + 6 MRFU (LO) modules	80 W (2 x 40 W) + 80 W (2 x 40 W)
		3 MRFUd (UO) + 3MRFUd (LO) modules	
GU+L/GL+U	GSM S8/8/8 + UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (MIMO)	3 MRFUd + 3 MRFUd (UO) + 3 MRFUd (LO) modules	20 W + 80 W (2 x 40 W) + 120 W (2 x 60 W)

NOTE
- These configurations assume that each cell uses one dual-polarized antenna.

- GU indicates that GSM and UMTS share one BBU.
- GL indicates that GSM and LTE share one BBU.
- UL indicates that UMTS and LTE share one BBU.
- GU+L indicates that GSM and UMTS share one BBU and LTE uses the other BBU.
- GL+U indicates that GSM and LTE share one BBU and UMTS uses the other BBU.

2.5 BTS3900AL

Outdoor macro BTS3900AL base stations use the following cabinets:

- Power supply cabinet: BTS3900AL (Ver.A)
- Transmission cabinet: TMC11H (Ver.D)
- Battery cabinet: IBBS700D/IBBS700T or IBBS300D/IBBS300T

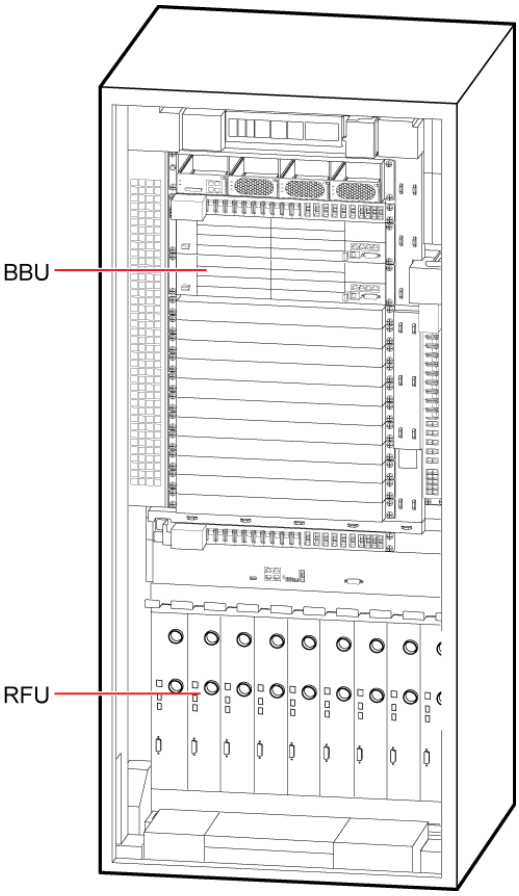
NOTE
For details on the TMC11H (Ver.D), see 2.8.1.5 TMC11H Series Outdoor Transmission Cabinet. For details on the IBBS700D and IBBS700T, see 2.8.1.9 IBBS700D/IBBS700T Outdoor Battery Cabinet. For details on the IBBS300D and IBBS300T, see 2.8.1.8 IBBS300D/IBBS300T Outdoor Battery Cabinet.

2.5.1 Cabinet

BTS3900AL (Ver.A) cabinets house BBUs and RFUs and provide the power distribution and surge protection functions. A BTS3900AL (Ver.A) cabinet houses a maximum of two BBUs and nine RFUs. This improves the integration of outdoor sites, saves installation space, and facilitates smooth evolution.

Figure 2-11 shows the internal structure of a BTS3900AL (Ver.A) cabinet.

Figure 2-11 Internal structure of a BTS3900AL (Ver.A) cabinet



2.5.2 Typical Configuration

The BTS3900AL mainly applies to multi-band and multimode scenarios where large capacity is required. They also support single-RAT applications. Table 2-6 lists the typical configurations of a multimode BTS3900AL cabinet.

Table 2-6 Typical configurations of a multimode BTS3900AL cabinet

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GU	GSM S8/8/8 (900 MHz) + GSM S8/8/8 (1800 MHz) + UMTS 3 x 2 (2100 MHz)	3 MRFUd (GO) + 3 MRFUd (GO) + 3 WRFU (UO) modules	20 W + 20 W + 40 W
	GSM S6/6/6 (900 MHz) + UMTS 3 x 1 (900 MHz + GSM S8/8/8 (1800 MHz) + UMTS 3 x 2 (2100 MHz)	3 MRFUd (GU) + 3 MRFUd (GO) + 3 WRFUd (UO) modules	20 W + 40 W +20 W + 80 W (2 x 40 W)

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GL	GSM S4/4/4 (900 MHz) + GSM S4/4/4 (1800 MHz) + LTE 3 x 20 MHz (MIMO)	3 GRFU (GO) + 3 GRFU (GO) + 3 LRFU (LO) modules	20 W + 80 W (2 x 40 W)
	GSM S6/6/6 + LTE S1/1/1 (10 MHz 2T2R)+ LTE 3 x 20 MHz (MIMO)	6 MRFU (GL) + 3 LRFU (LO) modules	20 W + 2 x 20 W + 80 W (2 x 40 W)
	GSM S8/8/8 (900 MHz) + LTE 3 x 20 MHz (800 MHz, MIMO)	3 MRFUd (GO) + 3 LRFU (LO) modules	20 W + 120 W (2 x 60 W)
UL	UMTS 3 x 2 + LTE 3 x 20 MHz (MIMO)	3 WRFU + 3 MRFU (LO) modules	40 W + 80 W (2 x 40 W)
		3 MRFU (UO) + 3 MRFU (LO) modules	
	UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (4T4R)	3 WRFUd + 6 LRFU modules	80 W (2 x 40 W) + 80 W (2 x 40 W)
		3 MRFUd (UO) + 6 MRFUd (LO) modules	
GU+L/GL+U (independent BBUs)	GSM S8/8/8 + UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (MIMO)	3 MRFUd (UO) + 3 WRFUd + 3 MRFUd (LO) modules	20 W + 80 W (2 x 40 W) + 120 W (2 x 60 W)
GU+L/GL+U (interconnected BBUs)	GSM S6/6/6 + UMTS 3 x 1 (MIMO) +GSM S6/6/6 + LTE 3 x 10 MHz (MIMO) + UMTS 3 x 2 (MIMO)	3 MRFUd (GU) + 3 MRFUd (GL) + 3 WRFU modules	20 W + 40 W (2 x 20 W) + 20 W + 40 W (2 x 20 W) + 80 W (2 x 40 W)

NOTE

- These configurations assume that each cell uses one dual-polarized antenna.
- GU indicates that GSM and UMTS share one BBU.
- GL indicates that GSM and LTE share one BBU.
- UL indicates that UMTS and LTE share one BBU.
- GU+L indicates that GSM and UMTS share one BBU and LTE uses the other BBU.
- GL+U indicates that GSM and LTE share one BBU and UMTS uses the other BBU.

2.6 BTS3900A

Outdoor macro BTS3900A base stations use BTS3900A (Ver.D) and BTS3900A (Ver.E) cabinets. The BTS3900A cabinet consists of the radio frequency cabinet (RFC), power supply cabinet, transmission cabinet, and battery cabinet.

- RFC: The RFC is installed outdoors and uses a direct ventilation system. Stacked with the power supply cabinet or transmission cabinet, this type of cabinets provides the power distribution, surge protection, and other protections for the RFUs and BBUs. An RFC can house a maximum of six RFUs.
- Power supply cabinet: The power supply cabinet houses the BBU. If 110 V AC or 220 V AC power supply is provided, an APM30H (Ver.D) or APM30H (Ver.E) is used. If -48 V DC power supply is provided, a TMC11H (Ver.D) or TMC11H (Ver.E) is used.
- Transmission cabinet: The TMC11H (Ver.D) or TMC11H (Ver.E) cabinet can be used if more space for transmission devices is required.
- Battery cabinet: The IBBS200T (Ver.E) or IBBS200D (Ver.E) battery cabinet can be used if long-term power backup is required. They are small and easy to transport.

NOTE

For details on the TMC11H (Ver.D) and TMC11H (Ver.E), see 2.8.1.5 TMC11H Series Outdoor Transmission Cabinet. For details on the IBBS200D and IBBS200T, see 2.8.1.7 IBBS200D and IBBS200T Outdoor Battery Cabinets.

2.6.1 Cabinet

The structure of a BTS3900A with -48 V DC power input is the same as that of a BTS3900A with AC power input. The only difference between these two types of cabinets lies in the configuration of power modules. The internal structure of a BTS3900A with AC power supply is used as an example.

Figure 2-12 shows the internal structure of a BTS3900A (Ver.D) cabinet with AC power supply.

Figure 2-12 Internal structure of a BTS3900A (Ver.D) with AC power supply

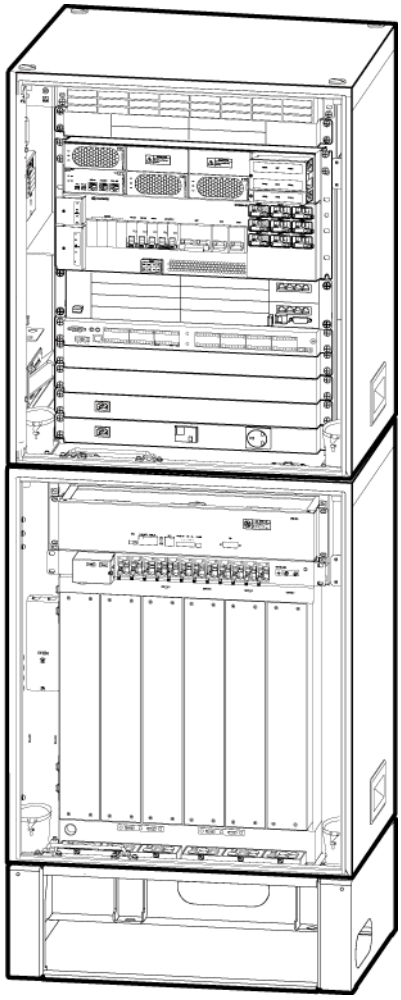


Figure 2-13 shows the internal structure of a BTS3900A (Ver.E) cabinet with AC power supply.

Figure 2-13 Internal structure of a BTS3900A (Ver.E) with AC power supply

2.6.2 Typical Configuration

Table 2-7 lists the typical configurations of a single-RAT BTS3900A.

Table 2-7 Typical configurations of a single-RAT BTS3900A

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 DRFU modules	20 W (900 MHz) or 18 W (1800 MHz)
	S12/12/12	6 GRFU modules	12 W
	S12/12/12	6 MRFU modules	12 W
	S12/12/12	6 MRFUe modules	20 W
	S8/8/8 + S8/8/8	3 MRFUd + 3 MRFUd modules	20 W (900 MHz) + 20 W (1800 MHz)
UMTS	3 x 4	3 WRFU modules	20 W
	3 x 4 (MIMO)	3 WRFUd modules	30 W (2 x 15 W)
	3 x 4	3 MRFU modules	20 W
	3 x 4 (MIMO)	3 MRFUd modules	40 W (2 x 20 W)

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
LTE	3 x 20 MHz (MIMO)	6 MRFU or 3 MRFUd modules	80 W (2 x 40 W) or 120 W (2 x 60 W)

NOTE
These configurations assume that each cell uses one dual-polarized antenna.

Table 2-8 lists the typical configurations of a dual-mode BTS3900A.

Table 2-8 Typical configurations of a dual-mode BTS3900A

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GU	GSM S4/4/4 + UMTS 3 x 2	3 MRFUd modules	20 W + 40 W
GL	GSM S8/8/8 + LTE 3 x 20 MHz (MIMO)	3 MRFUd (GO) + 3 MRFUd (LO) modules	20 W + 80 W (2 x 40 W)
UL	UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (MIMO)	3 MRFUd (UO) + 3 MRFUd (LO) modules	80 W (2 x 40 W) + 120 W (2 x 60 W)

NOTE
- These configurations assume that each cell uses one dual-polarized antenna.
- GU indicates that GSM and UMTS share one BBU.
- GL indicates that GSM and LTE share one BBU.
- UL indicates that UMTS and LTE share one BBU.

2.7 BTS3900C

The outdoor micro BTS3900C base station is applicable to hot spots, tunnels, edge network, and the areas without equipment rooms. The BTS3900C uses BTS3900C (Ver.C) cabinets that support UMTS only and multimode scenarios.

The BTS3900C consists of an OMB (Ver.C) and an RRU subrack.

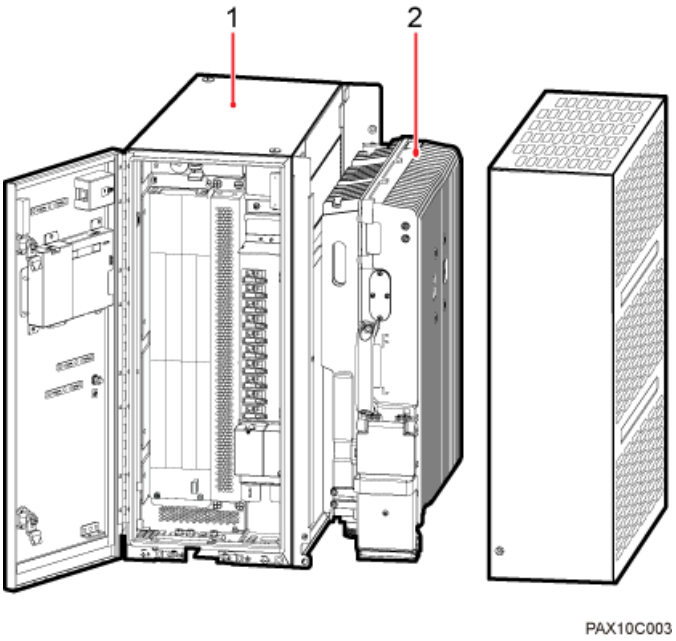
- The OMB (Ver.C) houses the BBU.
- The RRU subrack houses only direct current RRUs, including the RRU3804, RRU3801E, RRU3806, RRU3805, RRU3808, RRU3824, RRU3826, RRU3838, RRU3908 V2, RRU3929, RRU3829, RRU3828, RRU3928, RRU3926, RRU3936, and RRU3942.

2.7.1 Cabinet

The BTS3900C can be supplied with either DC or AC power.

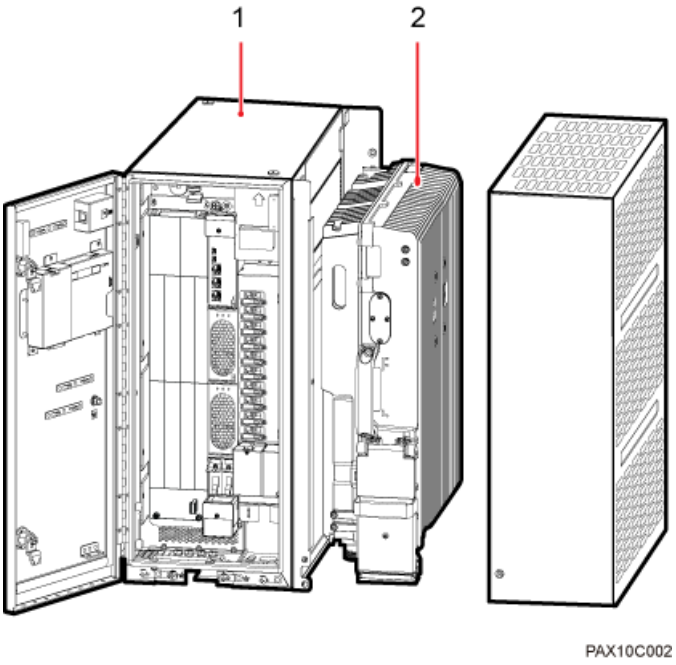
- If DC power is provided, the BTS3900C must be configured with a DC power distribution box. Figure 2-14 shows the internal structure of a BTS3900C (DC).
- If AC power is provided, the BTS3900C must be configured with an AC surge protection module, an AC power system, and a DC power distribution box. Figure 2-15 shows the internal structure of a BTS3900C (AC).

Figure 2-14 BTS3900C (DC)



(1) OMB (Ver.C)	(2) RRU subrack

Figure 2-15 BTS3900C (AC)



(1) OMB (Ver.C)	(2) RRU subrack

2.7.2 Typical Configuration

Table 2-9 lists the typical configurations of a BTS3900C.

Table 2-9 Typical configurations of a BTS3900C

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
UMTS	1 x 3	RRU3828	20 W
GU	GSM S2 + UMTS 1 x 2	RRU3928	20 W + 20 W
	GSM S2 + UMTS 1x1 (MIMO)	RRU3928	20 W + 2 x 20 W
GL	GSM S2 + LTE 1 x 10 MHz (MIMO)	RRU3928	20 W + 2 x 20 W

2.8 DBS3900

The distributed base station DBS3900 is designed to address the difficulty in site acquisition, as well as to facilitate network planning, deployment, and optimization. The DBS3900 enables operators to efficiently deploy a high-performance GSM, UMTS, and LTE network with a low total cost of ownership (TCO) by minimizing the investment in labor, electricity, and space.

2.8.1 Cabinet

The DBS3900 base station consists of functional modules (BBUs, RRUs, and AAUs) and various cabinets. This type of base stations is adaptive to diverse typical scenarios by flexible combining function modules and cabinets.

NOTE

- In terms of APM30H series cabinets, this document only describes the APM30H (Ver.D) and APM30H (Ver.E).
- In terms of TMC11H series cabinets, this document only describes the TMC11H (Ver.D) and TMC11H (Ver.E).
- In terms of IBBS200D/IBBS200T series cabinets: this document describes only the IBBS200D (Ver.D)/IBBS200D (Ver.E) and IBBS200T (Ver.D)/IBBS200T (Ver.E).

2.8.1.1 Typical Installation Scenarios

The typical installation scenarios of cabinets used for DBS3900 base stations vary with BBU installation modes, as shown in the following table.

Table 2-10 BBU installation modes

Environment	Installation Mode	Supported Power Supply
Outdoor	On the ground	AC and DC
	On the wall or pole	AC and DC
Indoor	On the ground	DC
	On the wall or rack	AC and DC

In each application scenario, the following principles apply:

- When RRUs need to be installed in a centralized manner on the ground outdoors, an outdoor pole support OPS06 is used.
- When RRUs need to be installed in a centralized manner indoors, an indoor L-shaped stand IFS06 is used.
- When the RRU is distant from the BBU and backup power is not required, AC RRUs are used. The AC RRUs are powered by the AC power equipment provided by the customer. When the AC RRUs are installed outdoors, each AC RRU must be configured with an SPD.

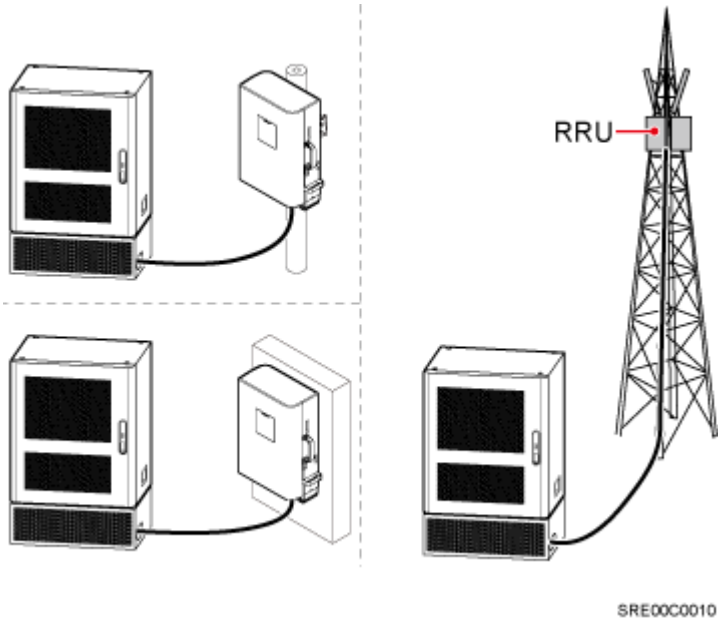
BBUs Installed Outdoors

Typical installation scenario 1: The BBU is installed on the ground outdoors.

- When AC power supply is used at the site, the APM30H (Ver.D)/APM30H (Ver.E)/TP48600A is configured to serve as a power cabinet. When long-time power backup is required, the battery cabinet can be configured.
- When –48 V DC power supply is used at the site, the TMC11H (Ver.D)/TMC11H (Ver.E) is configured to serve as a power cabinet.

The following figure shows the installation details.

Figure 2-16 BBUs installed on the ground outdoors

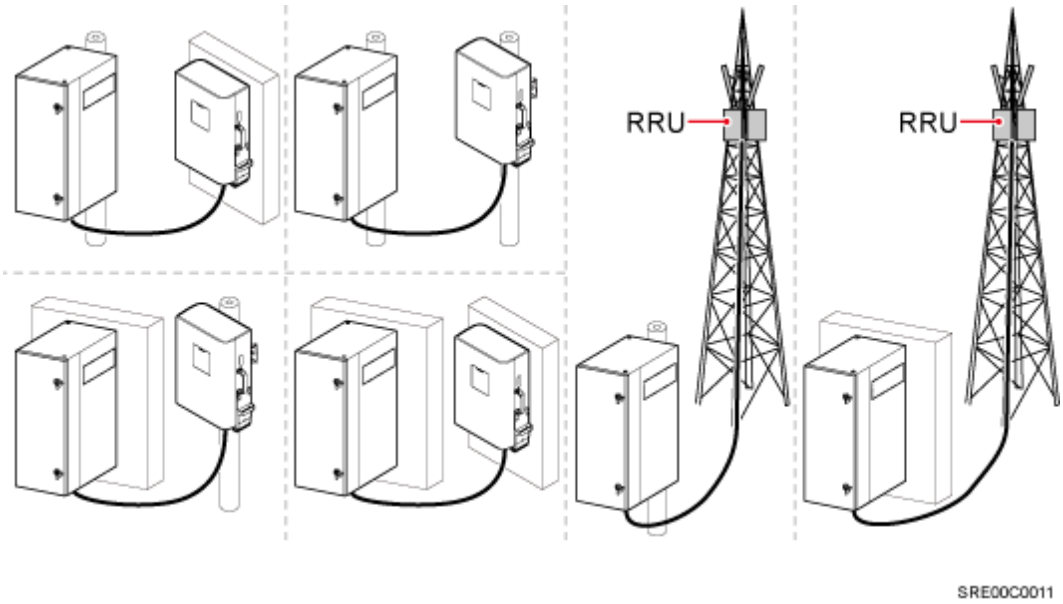


Typical installation scenario 2: The BBU is installed on the wall or pole outdoors.

- When AC power supply is used at the site, the OMB (Ver.C) AC cabinet is configured to serve as an AC power cabinet
- When –48 V DC power supply is used at the site, the OMB (Ver.C) DC cabinet is configured to serve as a DC power cabinet.

The following figure shows the installation details.

Figure 2-17 BBUs installed on the wall or pole outdoors



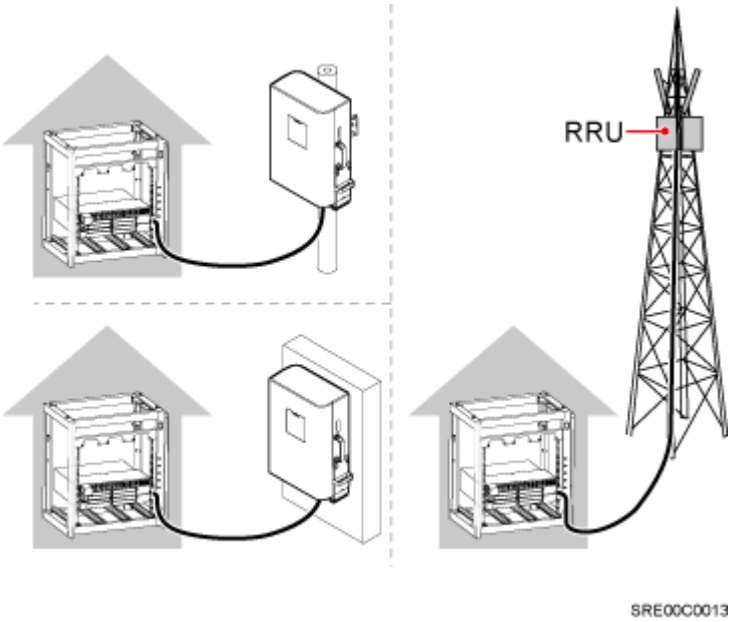
BBUs Installed Indoors

Typical installation scenario 1: The BBU is installed on the ground indoors.

When –48 V DC power supply is used at the site, the ILC29 (Ver.E) cabinet or 19-inch open rack (such as INS12) is configured for the BBU and power distribution unit installed indoors.

The following figure shows the installation details.

Figure 2-18 BBUs installed on the ground indoors

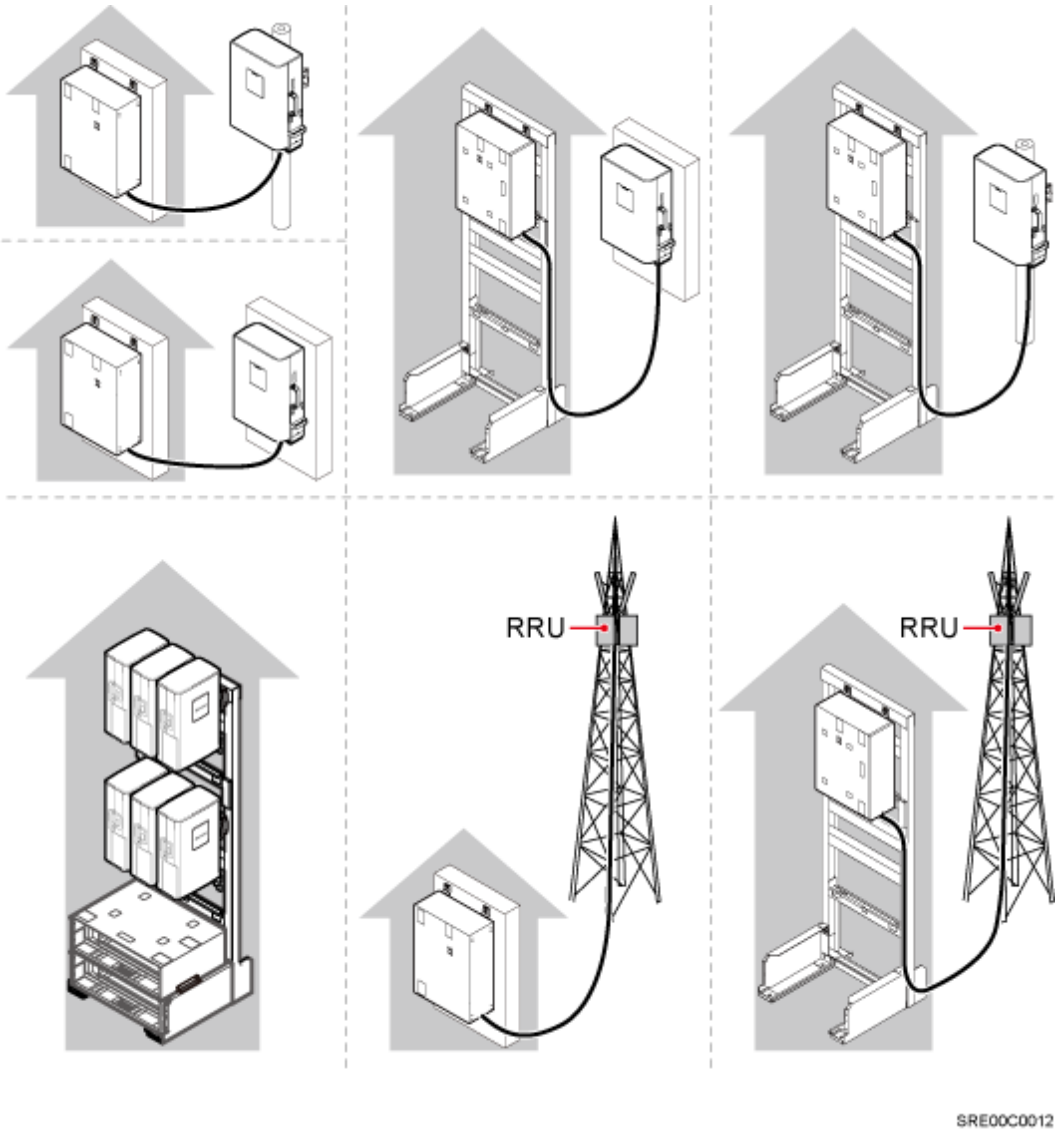


Typical installation scenario 2: The BBU is installed on the wall or rack indoors.

When AC or –48 V DC power supply is used at the site, the IMB series rack can be configured for the BBU and power distribution unit installed indoors.

The following figure shows the installation details.

Figure 2-19 BBUs installed on the wall indoors



NOTE

The IMB03 is installed horizontally at the bottom of the IFS06. In this way, both the BBU and RRU are installed in a centralized manner on the IFS06, which is also called an indoor centralized rack (ICR).

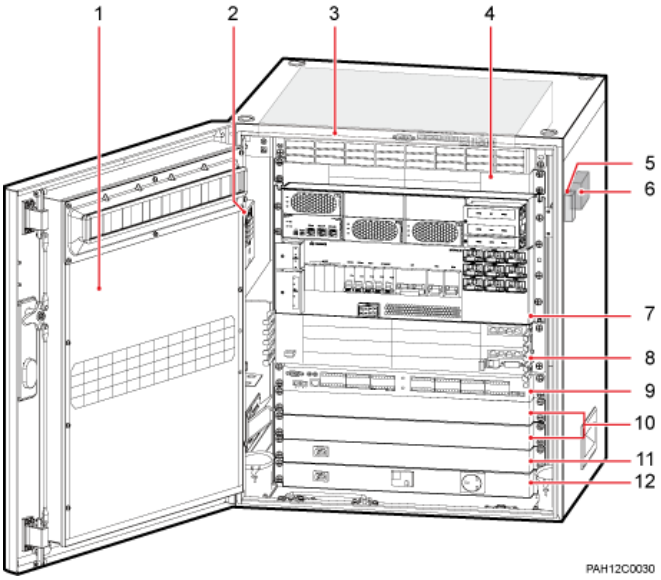
2.8.1.2 APM30H Series Outdoor Power Supply Cabinets

The APM30H (Ver.D) or APM30H (Ver.E) power supply cabinet provides DC power for the DBS3900 and also houses the BBU and other equipment. Two 12 Ah battery packs are configured in parallel in the APM30H (Ver.D) or APM30H (Ver.E) and supply power to the

cabinet for short-term use. The APM30H (Ver.D) and APM30H (Ver.E), which are small and light, dissipate heat using a heat exchanger as well as internal and external circulation fans.

Figure 2-20 shows the internal structure of an APM30H (Ver.D).

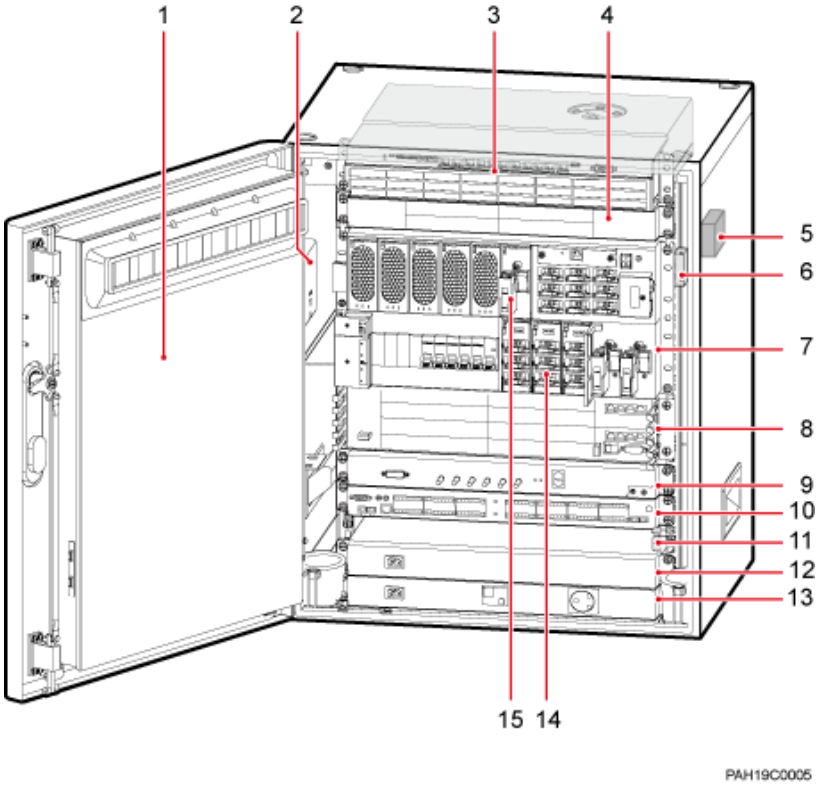
Figure 2-20 APM30H (Ver.D)



(1) Outdoor air circulation component	(2) Junction box	(3) Fan assembly
(4) Signal lightning protection unit (SLPU)	(5) Door status sensor	(6) Electronic label unit (ELU)
(7) Embedded power subrack unit (EPU) subrack	(8) BBU	(9) Environment monitoring unit type A (EMUA)
(10) Air baffle	(11) AC heater assembly unit (HAU)	(12) Service outlet unit (SOU)

Figure 2-21 shows the internal structure of an APM30H (Ver.E).

Figure 2-21 APM30H (Ver.E)



(1) Outdoor air circulation component	(2) Junction box	(3) Fan assembly
(4) SLPU	(5) ELU	(6) Door status sensor
(7) EPU subrack	(8) BBU	(9) GSM antenna and TMA control module (GATM)
(10) Environment monitoring unit (EMU)	(11) Air baffle	(12) AC HAU
(13) SOU	(14) PDU03D-02	(15) PDU01D-01

2.8.1.3 TP48600A Power Supply Cabinet

The TP48600A provides power for the DBS3900. It also houses the BBU and other equipment. Figure 2-22 shows the internal structure of a TP48600A.

Figure 2-22 TP48600A

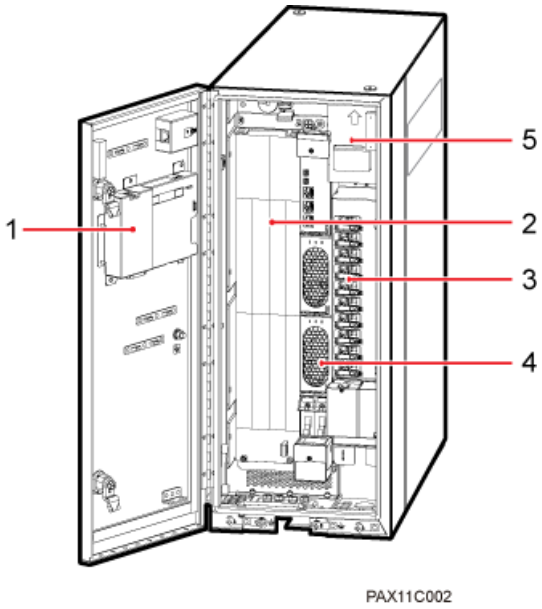
2.8.1.4 OMB (Ver.C) Outdoor Power Supply Cabinet

The OMB (Ver.C) power supply cabinet provides power for the DBS3900. It also houses the BBU and other equipment.

The OMB (Ver.C) power supply cabinet can be supplied with either AC or DC power.

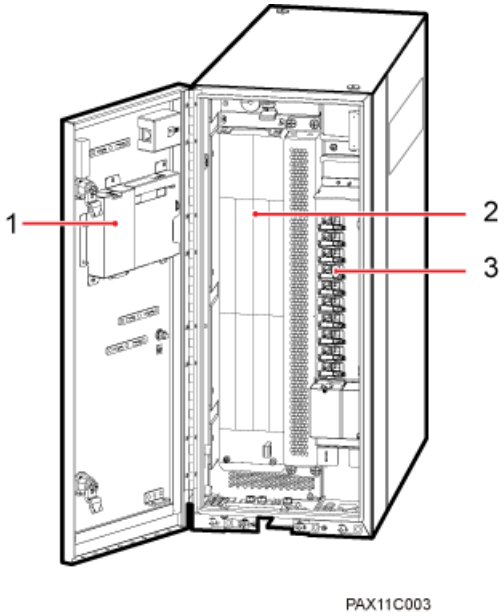
Figure 2-23 and Figure 2-24 show the internal structures of an OMB (Ver.C) AC cabinet and OMB (Ver.C) DC cabinet, respectively.

Figure 2-23 OMB (Ver.C) AC cabinet



(1) Heat exchange unit type B (HEUB)	(2) BBU	(3) DC power distribution box
(4) AC power system	(5) AC surge protector	-

Figure 2-24 OMB (Ver.C) DC cabinet



(1) HEUB	(2) BBU	(3) DC power distribution

		box

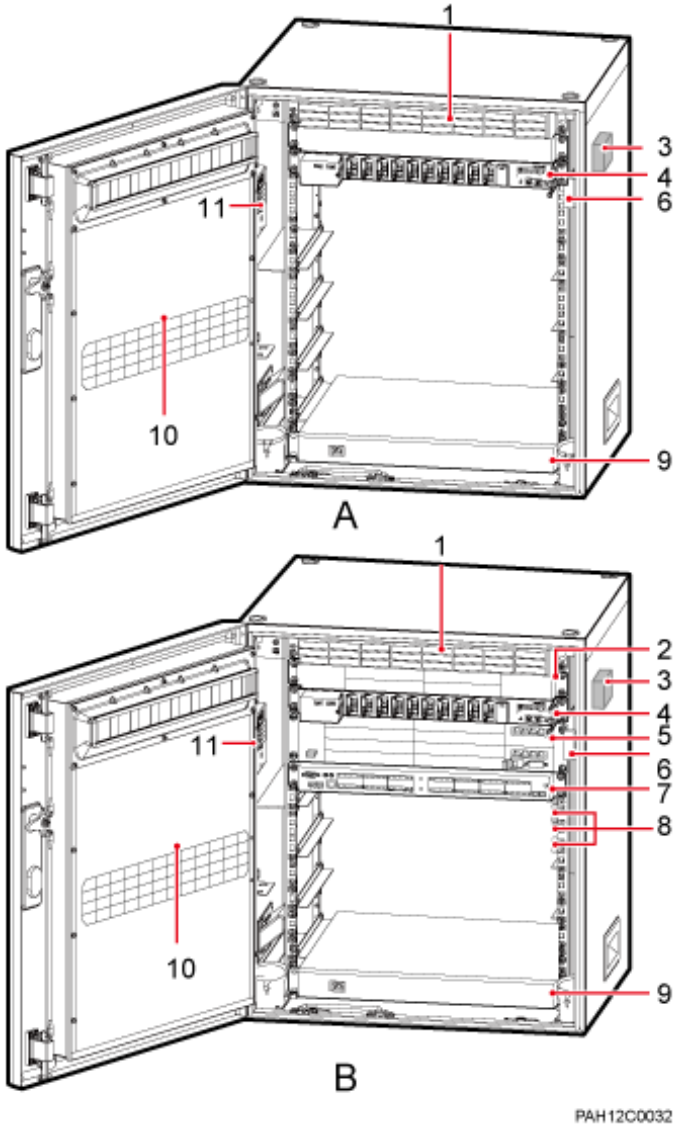
2.8.1.5 TMC11H Series Outdoor Transmission Cabinet

The TMC11H (Ver.D) and TMC11H (Ver.E) are used outdoors. They are small and easy to transport, and dissipate heat using a heat exchanger.

The TMC11H (Ver.D) or TMC11H (Ver.E) cabinet can be used if more space for transmission devices is required. The following figure A shows the internal structure of a TMC11H (Ver.D) or TMC11H (Ver.E) cabinet.

If -48 V DC power supply is provided, the TMC11H (Ver.D) or TMC11H (Ver.E) cabinet can be used as the DC power distribution cabinet. The following figure B shows the internal structure of a TMC11H (Ver.D) or TMC11H (Ver.E) cabinet when -48 V DC power supply is provided.

Figure 2-25 TMC11H (Ver.D) / TMC11H(Ver.E)



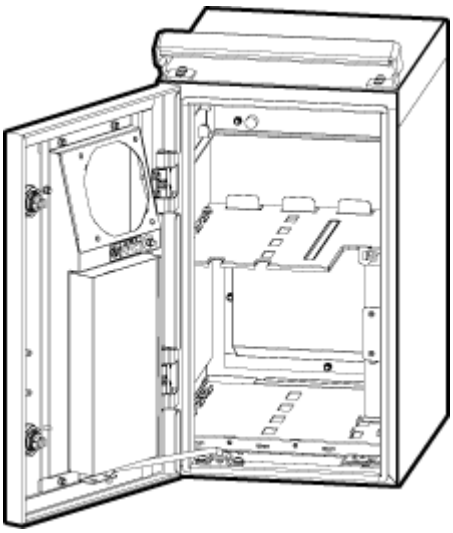
(1) Fan assembly	(2) SLPU	(3) ELU
(4) DCDU-12C	(5) BBU	(6) Door status sensor
(7) EMUA	(8) Filler module	(9) AC HAU
(10) Outer air circulation component	(11) Junction box	N/A

2.8.1.6 IBBS20D Outdoor Battery Cabinet

The IBBS20D can be used if long-term power backup is required. With built-in battery groups, an IBBS20D provides a maximum DC backup power capacity of 20 Ah.

An IBBS20D can be used outdoors and is small and easy to transport. The IBBS20D uses a direct ventilation system. The following figure shows the internal structure of an IBBS20D.

Figure 2-26 IBBS20D



2.8.1.7 IBBS200D and IBBS200T Outdoor Battery Cabinets

IBBS200T (Ver.D), IBBS200D (Ver.D), IBBS200T (Ver.E), and IBBS200D (Ver.E) battery cabinets can be used outdoors if long-term power backup is required. They are small and easy to transport. In terms of heat dissipation:

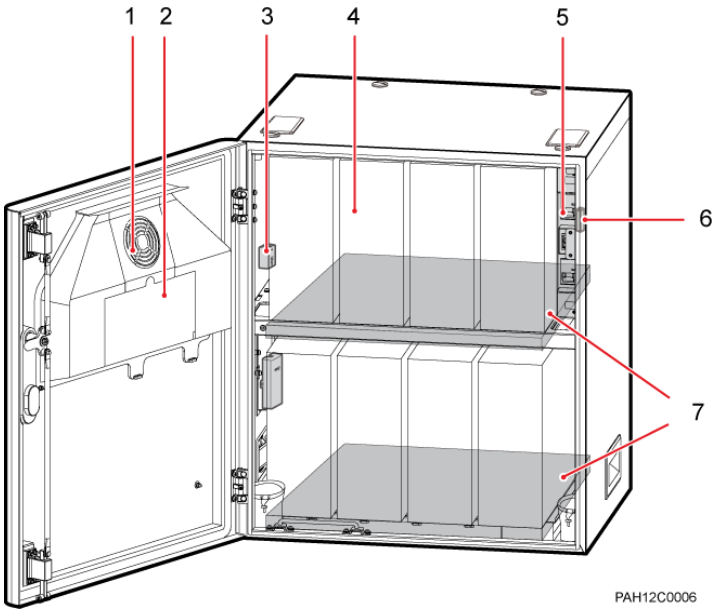
- The IBBS200D (Ver.D) or IBBS200D (Ver.E) uses a direct ventilation system.
- The IBBS200T (Ver.D) or IBBS200T (Ver.E) can operate at high temperatures because of a built-in air conditioner.

A BAU02D is optionally installed in a battery cabinet to check whether the batteries are installed. If the batteries are not installed, an alarm is reported. This function prevents batteries from being stolen.

With the built-in battery group, each IBBS200T (Ver.D), IBBS200D (Ver.D), IBBS200T (Ver.E), or IBBS200D (Ver.E) supports a maximum of 200 Ah backup power. Two of these cabinets support a maximum of 400 Ah DC backup power.

Figure 2-27 shows the internal structure of an IBBS200D (Ver.D) or IBBS200D (Ver.E).

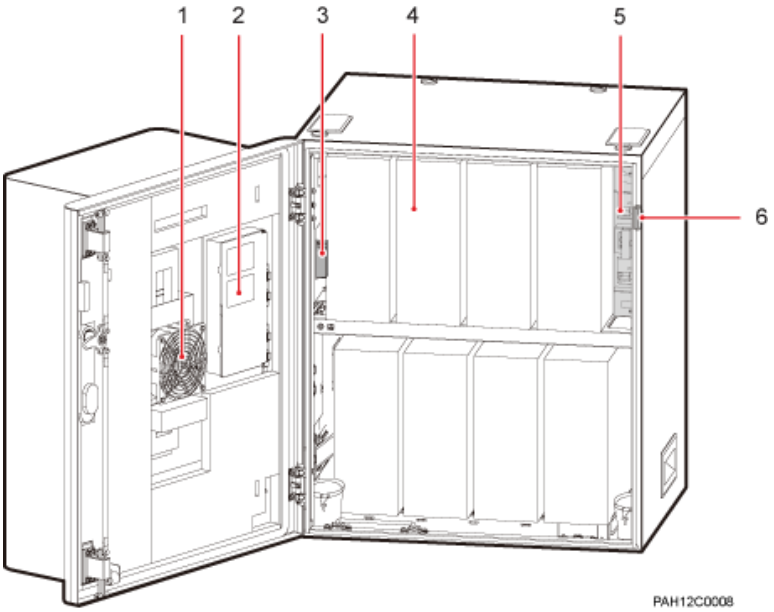
Figure 2-27 IBBS200D (the Ver.D cabinet is used as an example)



(1) Fan assembly	(2) Central monitoring unit type EA (CMUEA)	(3) ELU
(4) Storage battery	(5) Power distribution box (PDB)	(6) Door status sensor
(7) Heating film	N/A	N/A

Figure 2-28 shows the internal structure of an IBBS200T (Ver.D) or IBBS200T (Ver.E).

Figure 2-28 IBBS200T (the Ver.D cabinet is used as an example)



(1) Thermoelectric cooling unit (TEC)	(2) CMUEA	(3) ELU
(4) Storage battery	(5) PDB	(6) Door status sensor

2.8.1.8 IBBS300D/IBBS300T Outdoor Battery Cabinet

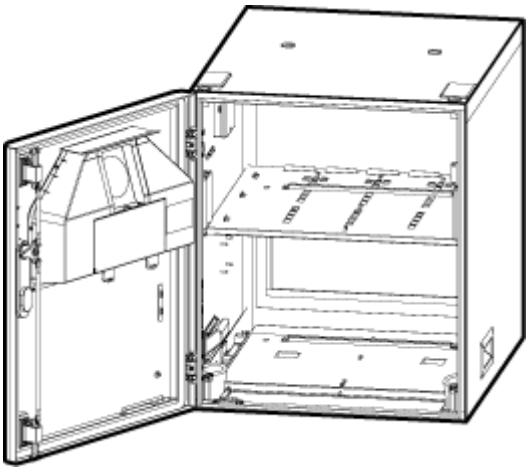
IBBS300D/IBBS300T is used when long-term power backup is required. With built-in battery groups, an IBBS300D/IBBS300T provides a maximum DC backup power capacity of 300 Ah. Two of these cabinets provide a maximum DC backup power capacity of 600 Ah.

IBBS300D/IBBS300T can be used outdoors.

- The IBBS300D uses a direct ventilation system.
- The IBBS300T has a built-in air conditioner and can operate at high temperatures.

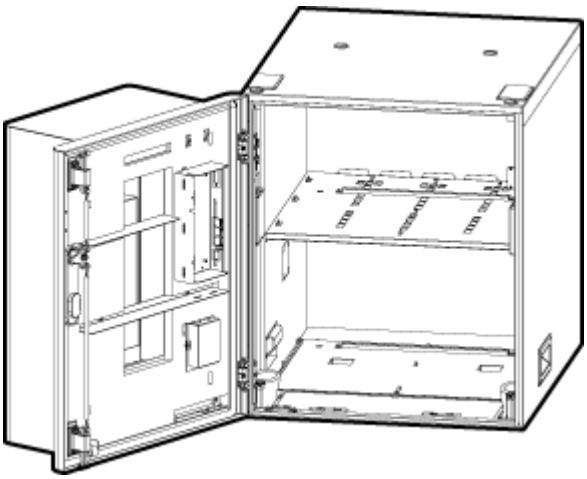
The following figure shows the internal structure of an IBBS300D.

Figure 2-29 IBBS300D



The following figure shows the internal structure of an IBBS300T.

Figure 2-30 IBBS300T



2.8.1.9 IBBS700D/IBBS700T Outdoor Battery Cabinet

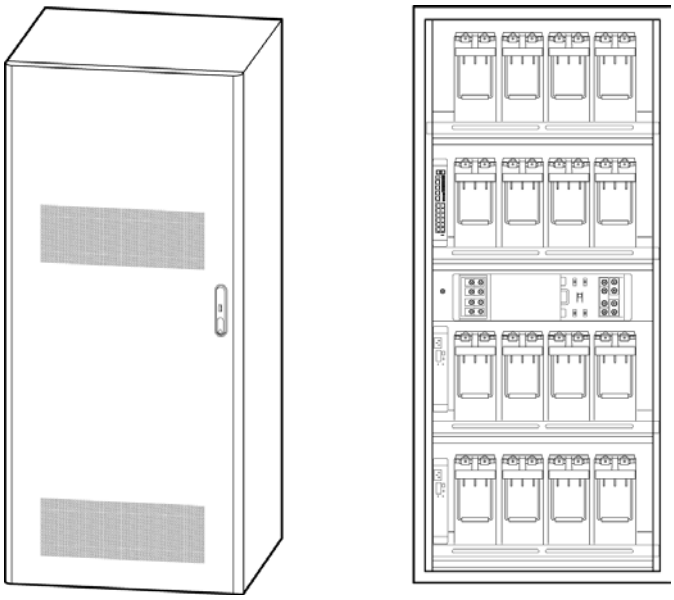
IBBS700D/IBBS700T can be used when long-term power backup is required. With built-in battery groups, an IBBS700D/IBBS700T provides a maximum DC backup power capacity of 600 Ah.

IBBS700D/IBBS700T can be used outdoors.

- The IBBS700D uses a direct ventilation system.
- The IBBS700T has a built-in air conditioner and can operate at high temperatures.

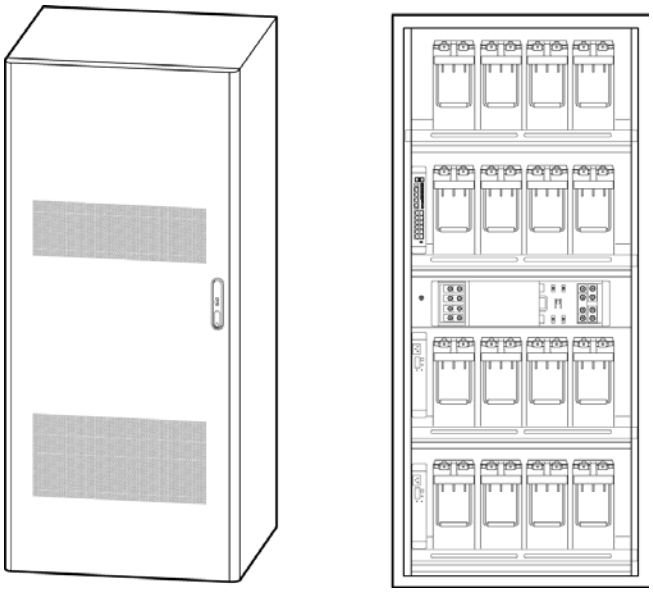
The following figure shows the internal structure of an IBBS700D.

Figure 2-31 IBBS700D



The following figure shows the internal structure of an IBBS700T.

Figure 2-32 IBBS700T

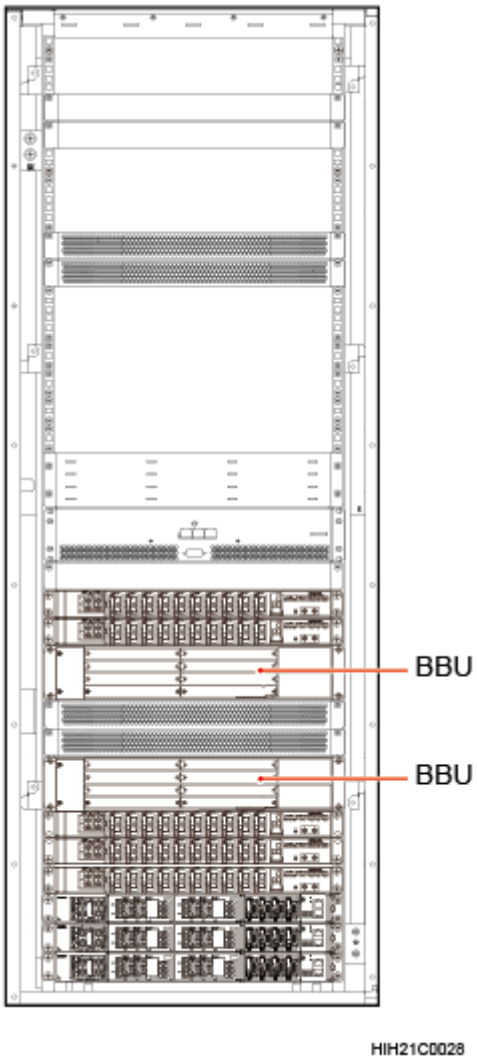


2.8.1.10 ILC29 (Ver.E) Indoor Power Cabinet

ILC29 (Ver.E) provides space for installing the BBU and power distribution equipment. One ILC29 (Ver.E) can house a maximum of two BBUs.

The following figure shows the internal structure of an ILC29 (Ver.E).

Figure 2-33 Internal structure of an ILC29 (Ver.E)



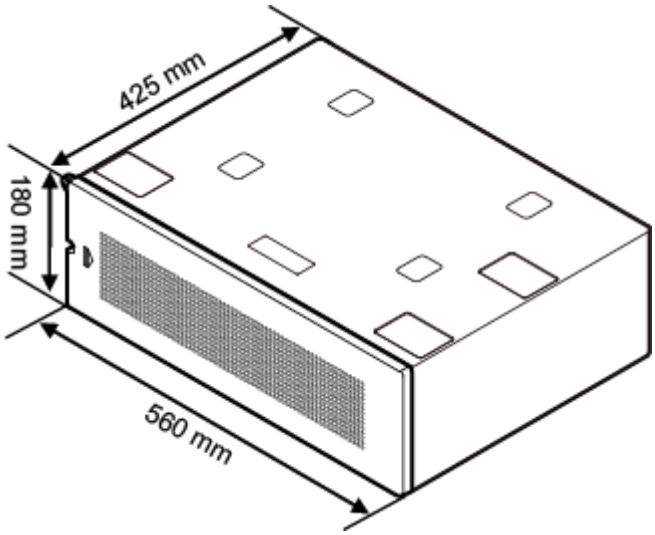
An ILC29 (Ver.E) supports only –48 V DC power input.

2.8.1.11 IMB Series Indoor Power Subracks

The IMB houses the BBU and other customer equipment. And this series of subracks is classified into two types: IMB03 and IMB05.

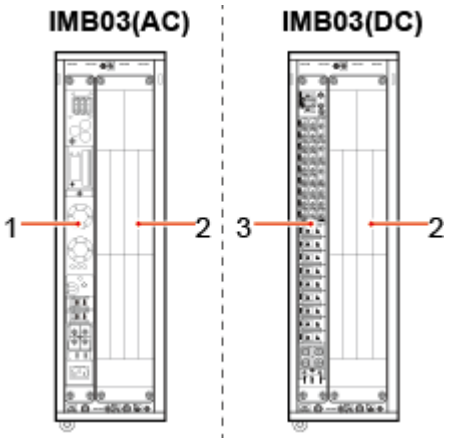
The following figure shows the exterior of an IMB03.

Figure 2-34 Exterior of an IMB03



An IMB03 provides 3 U installation space and can be supplied with either AC or DC power. It can be installed on a wall (side-mounted with its side or its back facing the wall), on an indoor floor installation support (horizontal), or on an H-shaped support (side-mounted). Figure 2-35 shows the IMB03 configuration.

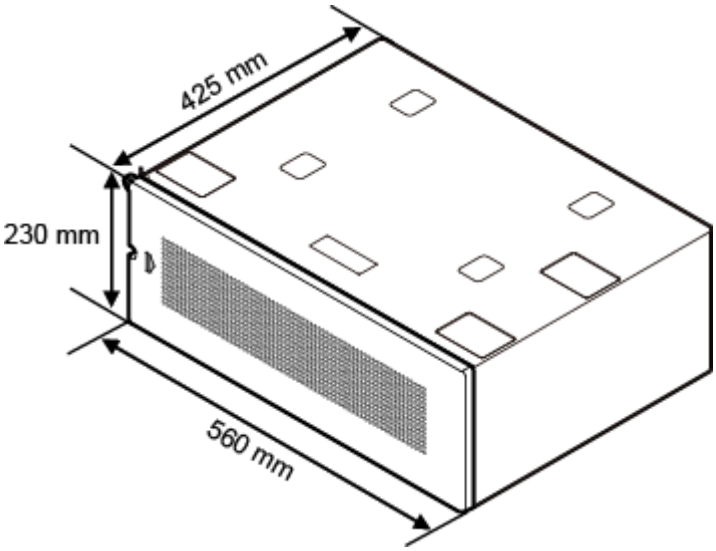
Figure 2-35 IMB03 configuration



(1) EPS30-4815AF or ETP48100-B1	(2) BBU	(3) DCDU-03B, DCDU-11B, DCDU-12B, or EPU02D

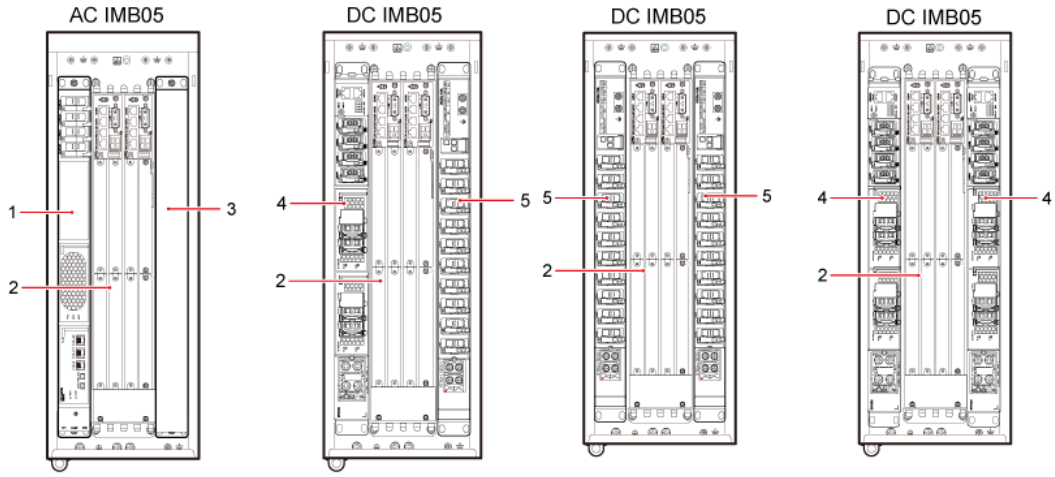
The following figure shows the exterior of an IMB05.

Figure 2-36 IMB05 exterior



An IMB05 provides 4 U installation space and can be supplied with either AC or DC power. It can be installed on a wall (side-mounted with its side or its back facing the wall), or on an indoor floor installation support (horizontal). The following figure shows the IMB05 configuration.

Figure 2-37 IMB05 cabinet configuration

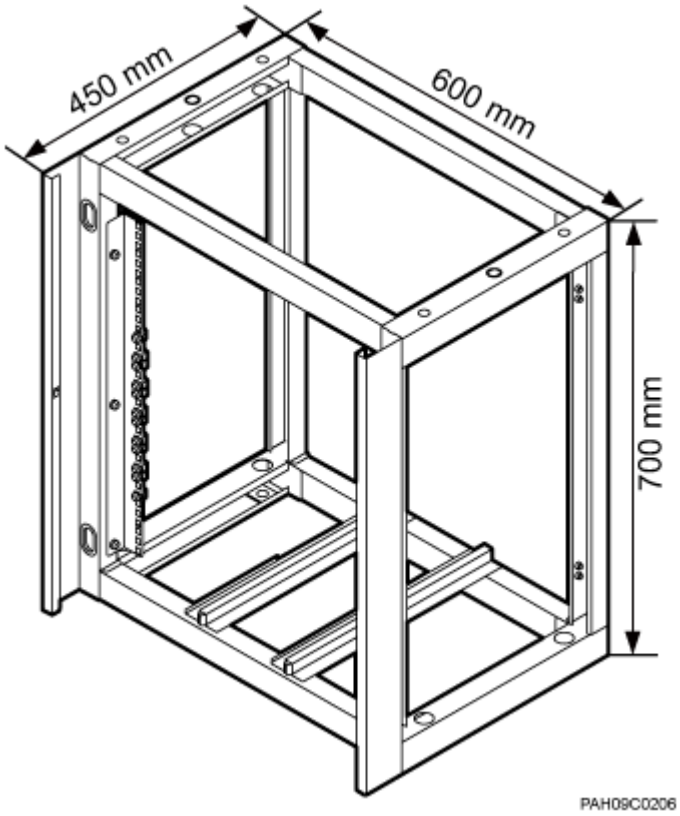


(1) ETP48100-B1	(2) BBU5900	(3) Filler panel
(4) EPU02D-02	(5) DCDU-12B	-

2.8.1.12 INS12 Indoor Open Rack

An INS12 provides 10 U high and 19 inches wide space for installing standard 19-inch wide devices such as the BBU and power distribution unit. The following figure shows an INS12. An INS12 can be installed on the ground or stacked with another INS12.

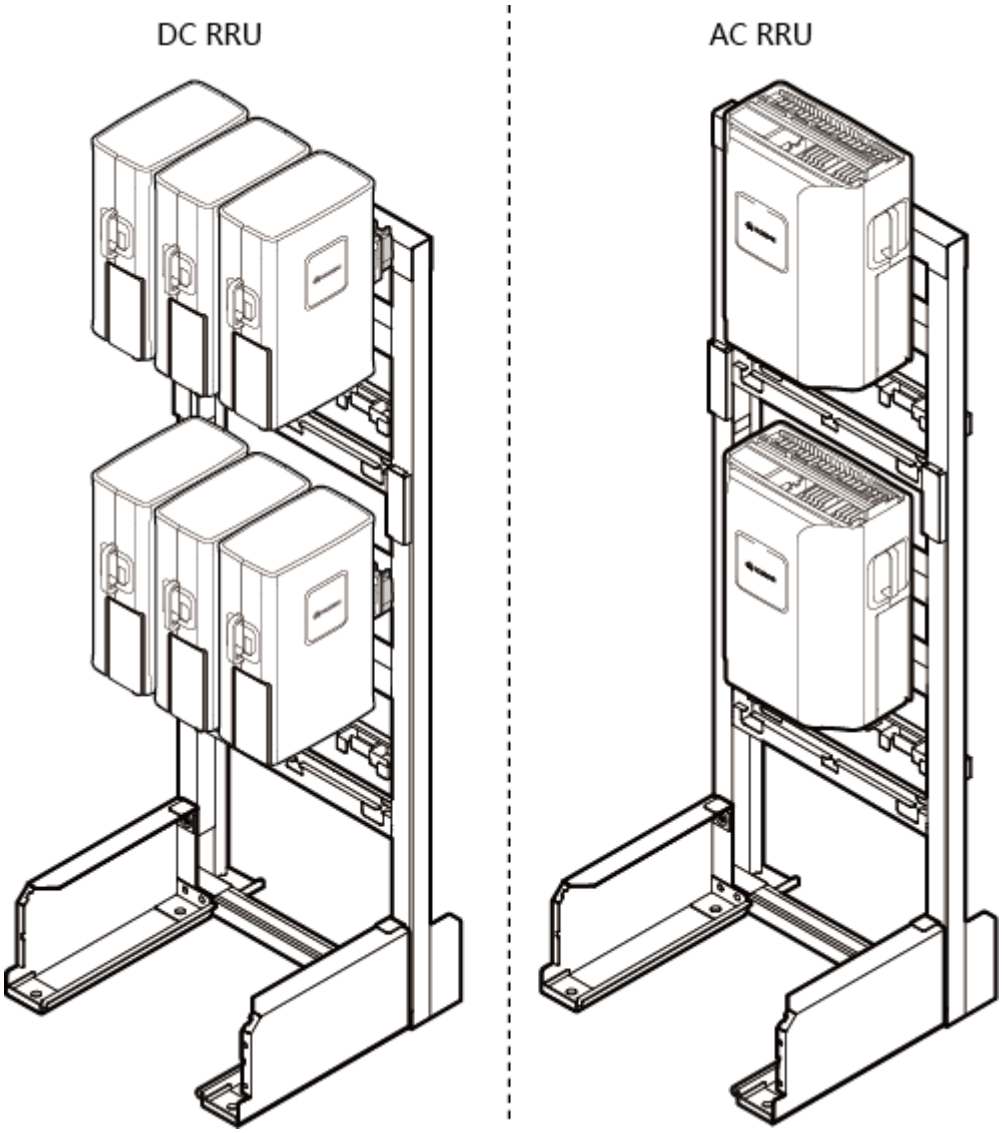
Figure 2-38 Indoor open rack



2.8.1.13 ICR (IFS06 or IMB03)

When RRUs need to be installed in a centralized manner at an indoor DBS3900 site, an ICR is used. The ICR can be installed on the floor with 6 U space at the bottom of the rack where two layers provide 3 U space each. The upper part of the ICR can house a maximum of six DC RRUs or two AC RRUs. Figure 2-39 shows an ICR.

Figure 2-39 ICR

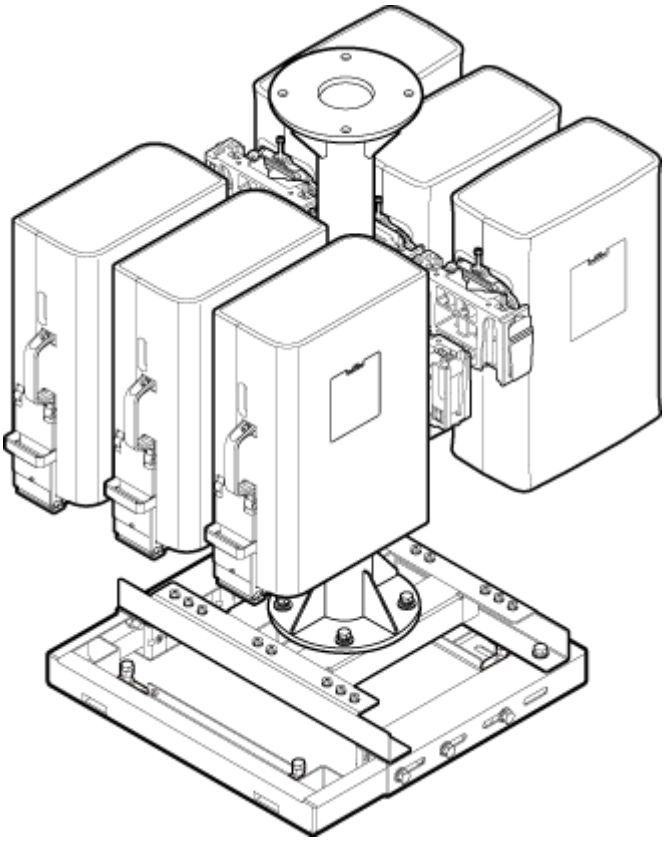


2.8.1.14 OPS06 Outdoor Pole Support

The OPS06 is a solution for installing Huawei RRUs outdoors. The OPS06 pole and base are used to install RRUs in a centralized manner. The OPS06 can be installed on the ground. The upper part of an OPS06 supports a maximum of six side-mounted RRUs or two horizontally installed RRUs.

The following figure shows an OPS06.

Figure 2-40 OPS06



2.8.2 Typical Configuration

Table 2-11 lists the typical configurations of a single-RAT DBS3900.

Table 2-11 Typical configurations of a single-RAT DBS3900

RAT	Typical Configuration	Number of RF Modules	Output Power of Each Carrier
GSM	S4/4/4	6 RRU3004 modules	15 W (900 MHz) or 10 W (1800 MHz)
	S4/4/4	3 RRU3008 modules	20 W
	S4/4/4	3 RRU3908 modules	20 W
UMTS	3 x 4	3 RRU3804 modules	15 W
	3 x 4	3 RRU3806 modules	20 W
	3 x 2 (MIMO)	3 RRU3908 modules	40 W (2 x 20 W)

RAT	Typical Configuration	Number of RF Modules	Output Power of Each Carrier
LTE	3 x 20 MHz (MIMO)	3 RRU3908 modules	40 W (2 x 20 W)

NOTE
These configurations assume that each cell uses one dual-polarized antenna.

Table 2-12 lists the typical configurations of a dual-mode DBS3900.

Table 2-12 Typical configurations of a dual-mode DBS3900

RAT	Typical Configuration	RF Modules	Output Power of Each Carrier
GU	GSM S4/4/4 + UMTS 3 x 2 (MIMO)	3 RRU3008 + 6 RRU3804 modules	20 W + 60 W (2 x 30 W)
		3 RRU3008 + 3 RRU3808 modules	20 W + 40 W (2 x 20 W)
GL	GSM S4/4/4+ LTE 3 x 20 MHz (MIMO)	3 RRU3008 + 3 RRU3908 (LO) modules	20 W + 40 W (2 x 20 W)
UL	UMTS 3 x 2 (MIMO) + LTE 3 x 20 MHz (MIMO)	6 RRU3804 + 3 RRU3908 (LO) modules	60 W (2 x 30 W) + 40 W (2 x 20 W)
		3 RRU3808 +3 RRU3908 (LO) modules	40 W (2 x 20 W) + 40 W (2 x 20 W)

NOTE
- GU indicates that GSM and UMTS share one BBU.
- GL indicates that GSM and LTE share one BBU.
- UL indicates that UMTS and LTE share one BBU.

2.9 Macro+Distributed Base Station

3900 series base stations allow a macro base station (a separated base station) and a distributed base station to be deployed at the same site. For example, the GSM RFUs and UMTS RRUs are connected to the same BBU. This deployment provides flexible networking of base stations, enabling easy evolution and capacity expansion.

The following table lists the maximum configurations of a macro+distributed base station.

Table 2-13 Maximum configurations of a macro+distributed base station

Base Station Type	Version	Base Station Mode	Number of BBUs	Number of RFUs	Number of RRUs
BTS3900	SRAN6.0 and later versions	Single- or dual-mode	1	12	6
		Triple-mode	2	12	9
	SRAN8.0 and SRAN9.0 (co-MPT)	Single-, dual-, or triple-mode	1	12	6
BTS3900L	SRAN6.0 and later versions	Single- or dual-mode	1	12	6
		Triple-mode	2	12	9
	SRAN8.0 and SRAN9.0 (co-MPT)	Single-, dual-, or triple-mode	1	12	6
BTS3900A	SRAN6.0 and later versions	Single- or dual-mode	1	6	9
		Triple-mode	2	6	9
	SRAN8.0 and SRAN9.0 (co-MPT)	Single-, dual-, or triple-mode	1	6	9
BTS3900A	SRAN11.0 (co-MPT)	Single-, dual-, or triple-mode	1	6	9
BTS3900AL	SRAN7.0 and later versions	Single- or dual-mode	1	9	9
		Triple-mode	2	9	12
	SRAN8.0 and SRAN9.0 (co-MPT)	Single-, dual-, or triple-mode	1	9	9

2.10 Cloud BB

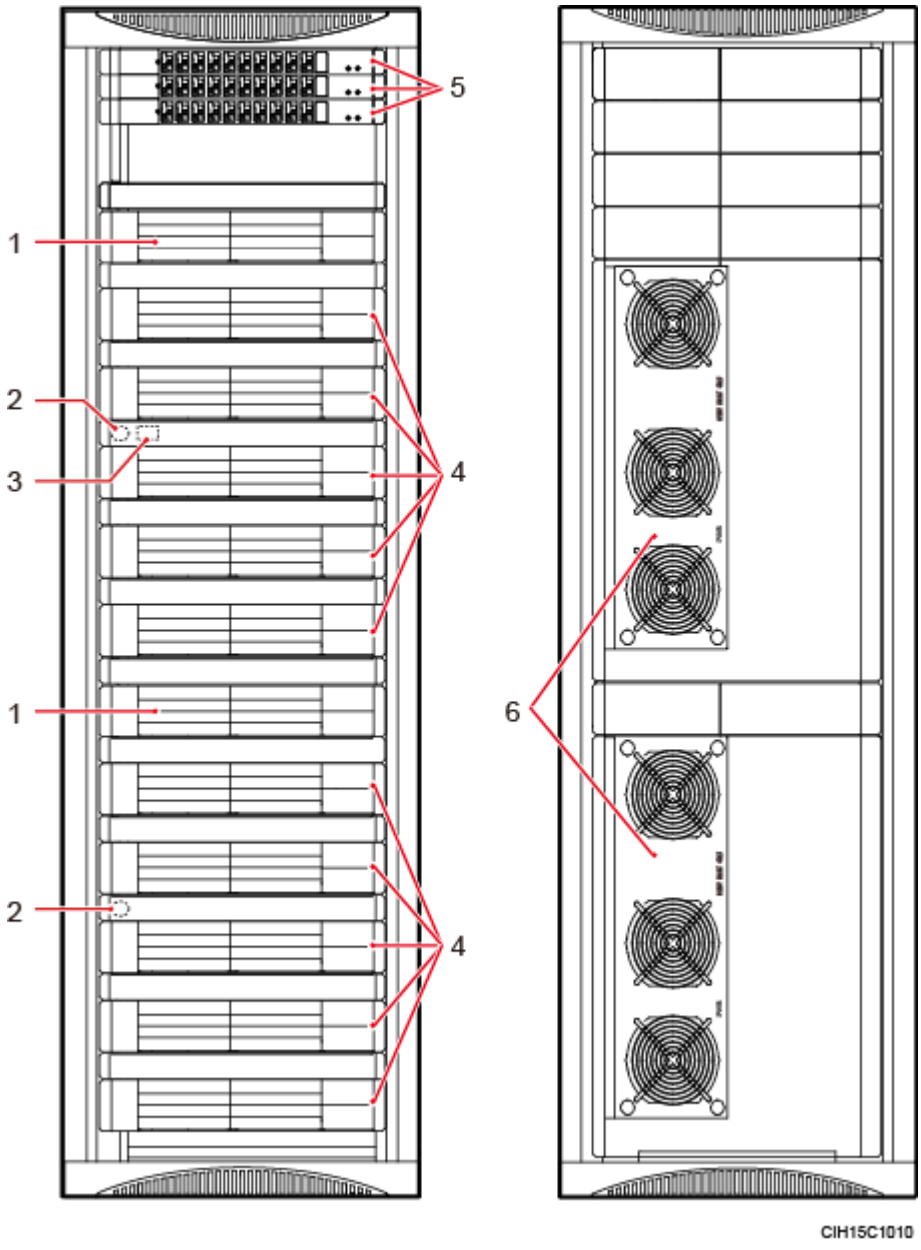
The cloud BB networking comprises multiple BBUs and USUs. The IBC10 cabinet houses the BBUs and USUs in a cloud BB network.

NOTE

This document describes only IBC10 cabinets. For details on USUs, see the product description of the USU in question.

Figure 2-41 shows the internal structure of an IBC10.

Figure 2-41 IBC10



(1) USU	(2) Temperature sensor at the air intake vent of the BBU	(3) ELU
(4) BBU	(5) DCDU-12C	(6) Fan assembly (FAU03D)

3 Logical Structure

This section describes the internal system structure and external function structure of 3900 series base stations.

3.1 System Structure

From the perspective of internal system structure, 3900 series base stations consist of the control subsystem, transport subsystem, baseband subsystem, RF subsystem, clock subsystem, and power and environment monitoring subsystem. The following figure and table describe the internal system structure of 3900 series base stations.

Figure 3-1 Internal system structure of 3900 series base stations

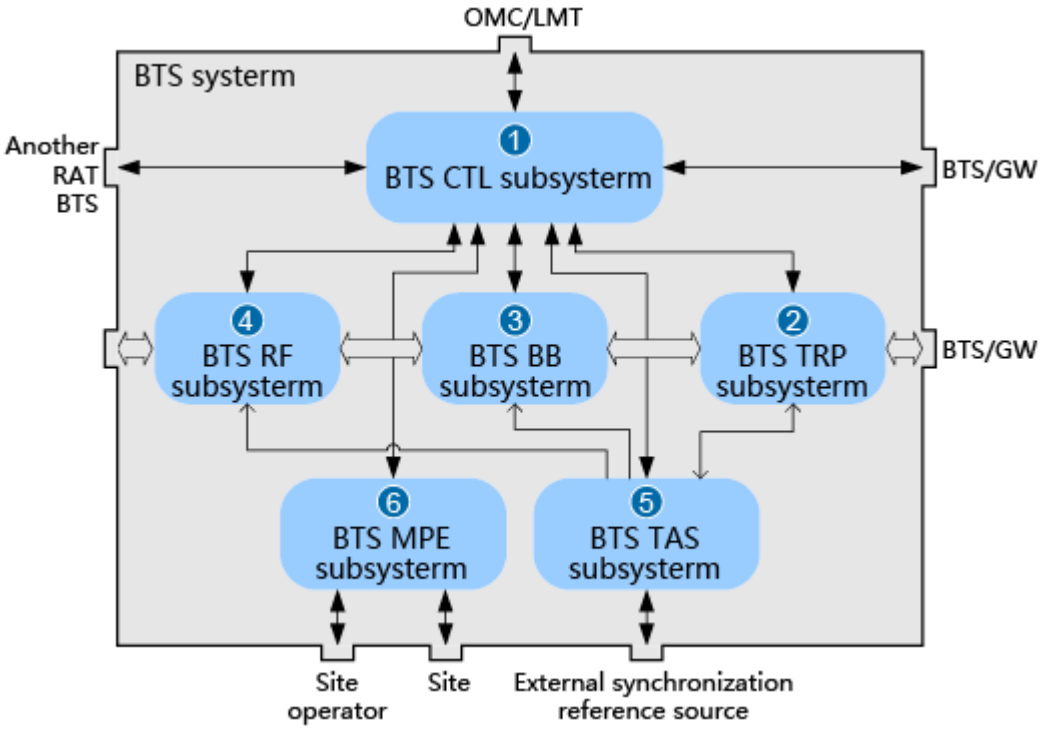


Table 3-1 Internal system structure of 3900 series base stations

Number	Internal System Structure	Function
1	Control subsystem (BTS CTL subsystem)	This subsystem controls and manages the resources in a base station. It provides the management plane interface between the base station and the OMC, the control plane interface between the base station and other NEs, and the interface for controlling and negotiating common devices in a multimode base station.
2	Transport subsystem (BTS TRP subsystem)	This subsystem forwards data between the transport network and the base station. It provides physical ports between the base station and the transport network as well as the user plane interface between the base station and other NEs.
3	Baseband subsystem (BTS BB subsystem)	This subsystem processes uplink and downlink baseband data.
4	RF subsystem (BTS RF subsystem)	This subsystem transmits and receives radio signals. It provides ports for data transmission between the antenna system and the base station.
5	Clock subsystem (BTS TAS subsystem)	This subsystem synchronizes the base station clock with external clock sources. It provides ports between the base station and external clock sources.
6	Power and environment monitoring subsystem (BTS MPE subsystem)	This subsystem provides power supply, dissipates heat, and monitors the environment for a base station. It also provides ports between the base station and site devices.

3.2 Function Structure

From the perspective of external function structure, the base station consists of the BTS node, GBTS service, NodeB service, and eNodeB service.

The following table and figure show the functional structure of a BTS. A BTS node uses abstract base station resources and a unified interface design. In this case, software and hardware differences are shielded and each service can be flexibly deployed on each type of resources. As a result, resources can be flexibly shared and allocated among all types of service.

Figure 3-2 BTS functional structure

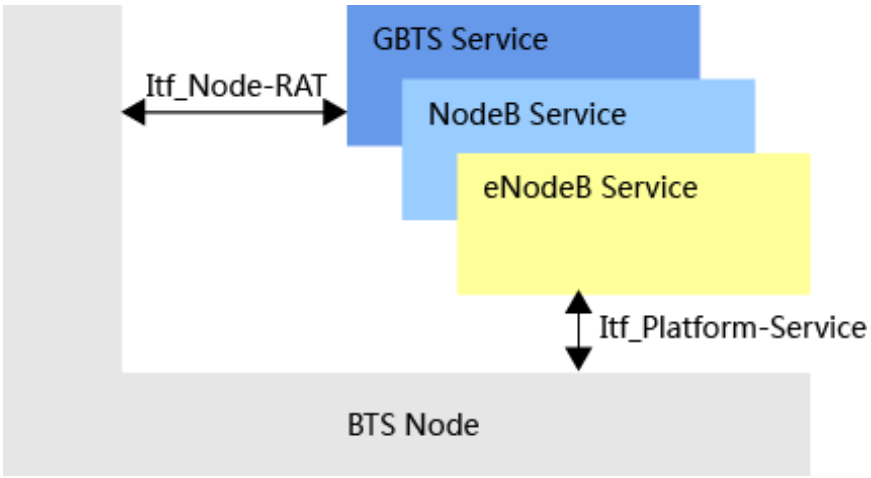


Table 3-2 BTS functional structure

Number	Object	Function
1	BTS Node	A physical base station, which provides the infrastructure and application platform for a base station to deploy the GBTS service, NodeB service, and eNodeB service. The BTS nodes are classified into single-RAT and multi-RAT base stations based on the types and number of deployed services.
2	GBTS Service	Services provided by GSM base stations, which are controlled by the GBSC service and perform the logical functions of GSM base stations, including radio channel management, physical layer protocol processing, and signaling procedure processing.
3	NodeB Service	Services provided by WCDMA base stations, which are controlled by RNC service and perform the logical functions of WCDMA base stations, including radio channel management, physical layer protocol processing, and signaling procedure processing.
4	eNodeB Service	Services provided by LTE base stations, which perform the logical functions of LTE base stations. These functions include radio resource management, radio channel management, mobility management, physical layer protocol processing, signaling procedure processing, and access control. The LTE FDD only, NB-IoT only, LTE TDD only, LT, and LM modes are supported.
5	Itf_Platform-Service	Service control interfaces provided by the BTS node, including the interfaces for service deployment, version upgrade, start and restart, and status monitoring.
6	Itf_Node-RAT	Interfaces provided by the BTS nodes to control the common resources in a base station, including the interfaces for resource application, release, activation, and reconfiguration. Common resources in a base station include transmission resources, carrier resources, and universal resources such as SCTP links, RF TX and

Number	Object	Function
		RX channels, and CPU progress. SCTP is short for Signaling Control Transmission Protocol.

4 Operation and Maintenance

4.1 Overview

OM Methods

3900 series base stations can be maintained using the following methods:

- Local maintenance: OM personnel maintain the base station on the local maintenance terminal (LMT) or site maintenance terminal system (SMT) through the local maintenance port of the base station.
- Remote maintenance: OM personnel maintain the base station on the U2000 or LMT in the equipment room or the centralized management center.

Base Station Concept

On the EMS, a base station is a management entity providing RAT Services of one or multiple RATs. Base stations are independent of each other and have different deployment IDs (DIDs). In this document, the RAT Service provided by a 3900 series base station includes GBTS Service, NodeB Service, and eNodeB Service. For related function descriptions, see 3.2 Function Structure.

Based on the number of RAT Services deployed, base stations on the EMS are classified into the following two types:

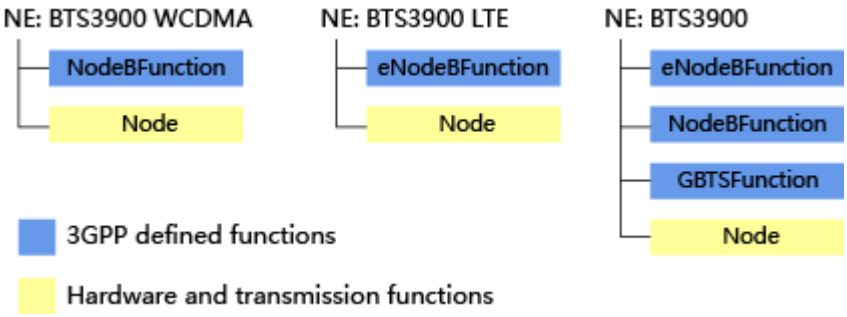
- A base station deployed with one RAT is called a single-RAT or single-mode base station.
- A base station deployed with two or more RATs is called a multi-RAT or multimode base station. On the U2000 GUI, **Multimode Base Station** refers to all types of multi-RAT or multimode base stations, for example, separate-MPT multimode base stations and co-MPT multimode base stations. A co-MPT base station deployed with only one RAT is also called a multimode base station.

NE Concept

Each BTS Node in a base station has an independent OM channel. The BTS Node together with the RAT Service deployed is called an NE, which can be independently managed by the LMT, SMT, or U2000.

Single-RAT base stations have the NE types: **BTS3900 WCDMA** and **BTS3900 LTE**. Multi-RAT base stations have one NE type **BTS3900**. The following figure shows the NE management architecture.

Figure 4-1 NE management architecture



NOTE

- The GBTS is managed by the BSC and is not an independent NE on the U2000 client. Therefore, the GBTS is not displayed on the U2000. For details on the GBTS operation and maintenance, see GSM initial configuration guide and GBSS reconfiguration guide.
- The eGBTS has the same OM system as a co-MPT multimode base station. The NE type of the eGBTS is **BTS3900**.

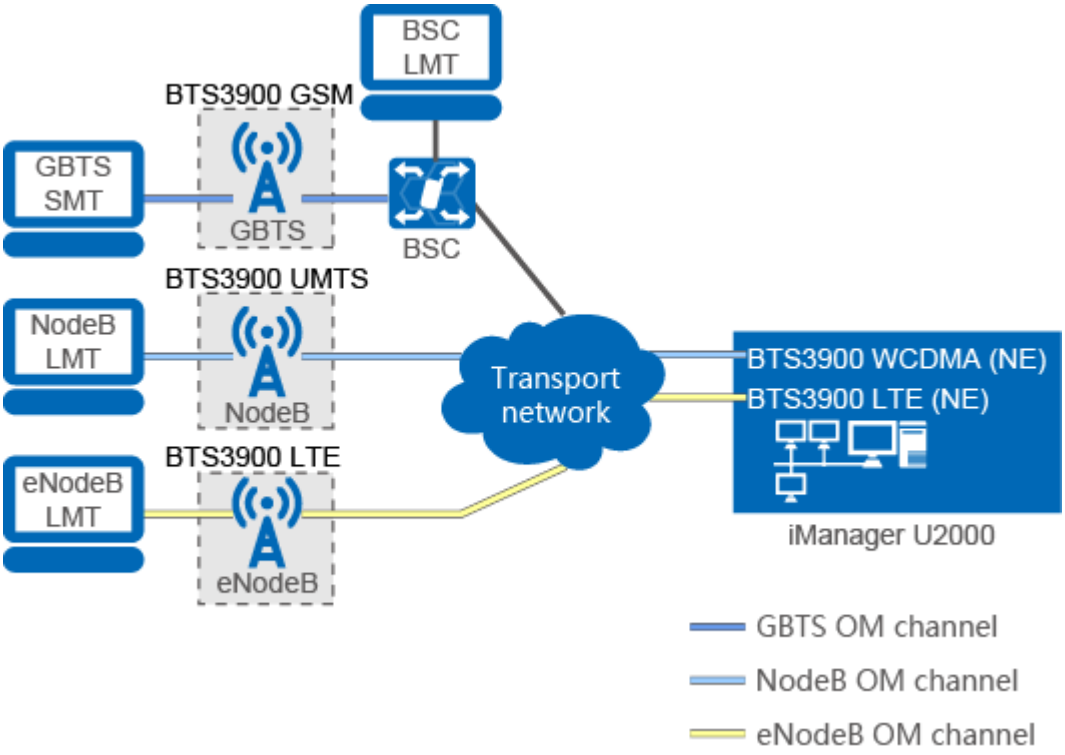
4.2 Operation and Maintenance for Single-RAT Base Stations

A single-RAT base station serves only one RAT, has one OM interface, represents one NE, and is connected to the U2000.

- The NE type of the NodeB on the U2000 is **BTS3900 WCDMA**.
- The NE type of the eNodeB on the U2000 is **BTS3900 LTE**.

Figure 1 shows the OM systems of the NodeB and eNodeB.

Figure 4-2 OM systems of the NodeB and eNodeB.



4.3 Operation and Maintenance for Multi-RAT Base Stations

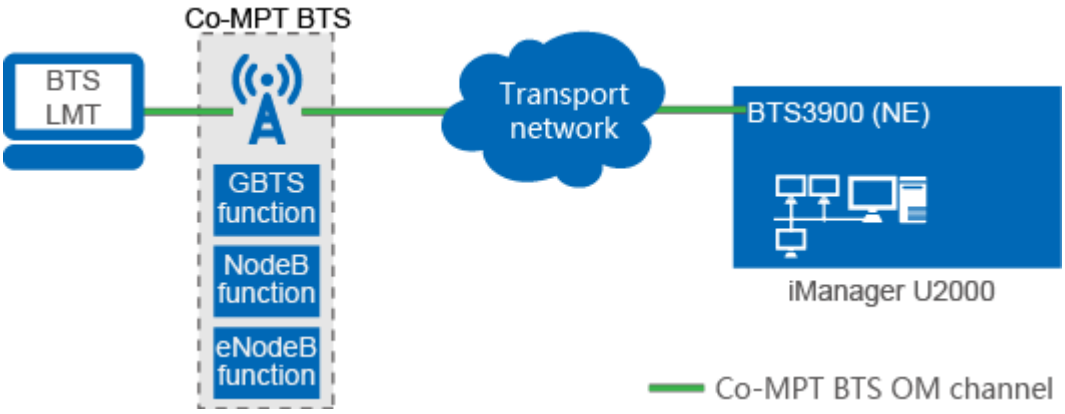
Operation and Maintenance for Co-MPT Multimode Base Stations

Multiple RATs in a co-MPT base station are deployed on the same main control board. These RATs share one OM interface, represent one NE, and are connected to one U2000.

The NE type of the co-MPT base station on the U2000 is **BTS3900**.

Figure 4-3 shows the OM system of a co-MPT base station.

Figure 4-3 OM system of a co-MPT base station



Operation and Maintenance for Separate-MPT Multimode Base Stations

Multiple RATs in a separate-MPT base station are deployed on different main control boards. These RATs have different OM interfaces, represent different NEs, and are connected to one U2000 through different OM channels.

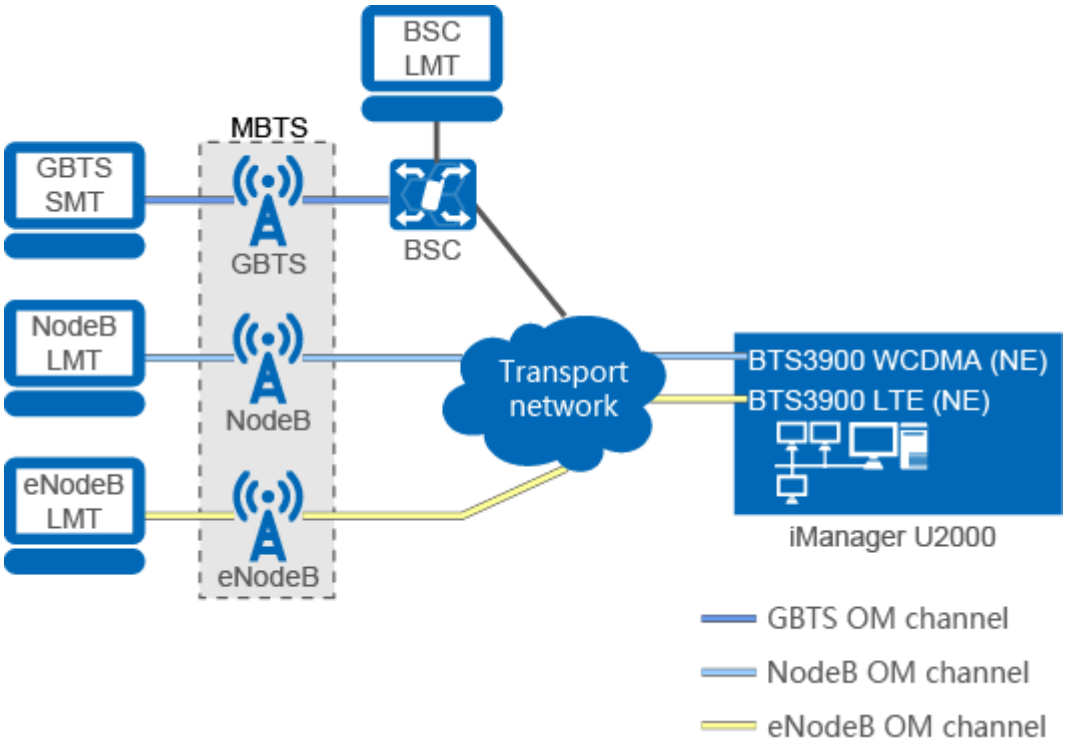
For the NEs in a separate-MPT base station:

- They are independently managed on the base station LMT/SMT.
- They belong to the same base station and have the same DID on the U2000. The U2000 provides a unified GUI to manage NEs in a separate-MPT base station.

The separate-MPT base station is indicated by **MBTS** on the U2000. In a separate-MPT base station, the NE types of NodeB and eNodeB are **BTS3900 WCDMA** and **BTS3900 LTE**, respectively.

The following figure shows the OM system of a separate-MPT base station.

Figure 4-4 OM system of a separate-MPT base station



5 Technical Specifications

5.1 Input Power

Table 5-1 Input power

Cabinet	Input Power
BTS3900 (Ver.D)	• -48 V DC; voltage range: -38.4 V DC to -57 V DC • 200 V AC to 240 V AC single-phase; voltage range: 176 V AC to 290 V AC • 220/346 V AC to 240/415 V AC three-phase; voltage range: 176/304 V AC to 290/500 V AC
BTS3900A (Ver.D) and BTS3900A (Ver.E)	• -48 V DC; voltage range: -38.4 V DC to -57 V DC • 120/208 V AC to 127/220 V AC dual-live wire; voltage range: 105/176 V AC to 150/260 V AC • 100/200 V AC to 120/240 V AC dual-live wire; voltage range: 90/180 V AC to 135/270 V AC • 200 V AC to 240 V AC single-phase; voltage range: 176 V AC to 290 V AC • 220/346 V AC to 240/415 V AC three-phase; voltage range: 176/304 V AC to 290/500 V AC
BTS3900L (Ver.D)	• -48 V DC; voltage range: -38.4 V DC to -57 V DC • 200 V AC to 240 V AC single-phase; voltage range: 176 V AC to 290 V AC • 220/346 V AC to 240/415 V AC three-phase; voltage range: 176/304 V AC to 290/500 V AC
DBS3900 (Ver.D)	• BBU3900 (UPEUc): -48 V DC; voltage range: -38.4 V DC to -57 V DC • BBU3910 (UPEUd): -48 V DC; voltage range: -38.4 V DC to -57 V DC • RRU: -48 V DC; voltage range: -36 V DC to -57 V DC
BTS3900AL (Ver.A)	• 120/208 V AC to 127/220 V AC dual-live wire; voltage range: 105/176 V AC to 150/260 V AC

Cabinet	Input Power
	• 100/200 V AC to 120/240 V AC dual-live wire; voltage range: 90/180 V AC to 135/270 V AC • 200 V AC to 240 V AC single-phase; voltage range: 176 V AC to 290 V AC • 220/346 V AC to 240/415 V AC three-phase; voltage range: 176/304 V AC to 290/500 V AC • -48 V DC; voltage range: -38.4 V DC to -57 V DC
BTS3900C (Ver.C)	• -48 V DC; voltage range: -38.4 V DC to -57 V DC • 200 V AC to 240 V AC single-phase; voltage range: 176 V AC to 290 V AC • 100/200 V AC to 120/240 V AC dual-live wire; voltage range: 90/180 V AC to 135/270 V AC

5.2 Equipment Specifications

Table 5-2 Equipment specifications

Item	Cabinet		Specifications
Dimensions (H x W x D)	BTS3900 (Ver.D) (DC)		900 mm x 600 mm x 450 mm
	BTS3900 (Ver.D) (AC)		1250 mm x 600 mm x 450 mm (including the IMS06) Base: 40 mm x 600 mm x 420 mm
	BTS3900A (Ver.D) and BTS3900A (Ver.E)	RFC (Ver.D) and RFC (Ver.E)	700 mm x 600 mm x 480 mm
		APM30H (Ver.D), TMC11H (Ver.D), APM30H (Ver.E), and TMC11H (Ver.E)	700 mm x 600 mm x 480 mm
		Base	200 mm x 600 mm x 434 mm
	BTS3900L (Ver.D) (DC)		1600 mm x 600 mm x 450 mm
	BTS3900L (Ver.D) (AC)		1950 mm x 600 mm x 450 mm (including the IMS06) Base: 40 mm x 600 mm x 420 mm
	BTS3900AL (Ver.A)		1925 mm x 770 mm x 750 mm (including the base) Base: 200 mm x 770 mm x 700 mm

Item	Cabinet	Specifications
	BTS3900C (Ver.C)	600 mm x 420 mm x 430 mm OMB (Ver.C): 600 mm x 240 mm x 430 mm RRU: 600 mm x 180 mm x 430 mm
	ILC29 (Ver.E)	Cabinet: 1600 mm x 600 mm x 450 mm Base: 40 mm x 600 mm x 420 mm
	IMB05	560 mm x 425 mm x 230 mm
Weight	BTS3900 (Ver.D) (DC)	• In SRAN8.0, SRAN9.0, and SRAN10.1: full configuration ≤ 135 kg (including one BBU and six RFUs, but excluding the AC power module) • In SRAN11.1 and later versions: full configuration ≤ 138 kg (including one BBU and six RFUs, but excluding the AC power module)
	BTS3900 (Ver.D) (AC)	• In SRAN8.0, SRAN9.0, and SRAN10.1: full configuration ≤ 180 kg (including one BBU, six RFUs, and the AC power module) • In SRAN11.1 and later versions: full configuration ≤ 183 kg (including one BBU, six RFUs, and the AC power module)
	BTS3900A (Ver.D) and BTS3900A (Ver.E)	• In SRAN8.0, SRAN9.0 and SRAN10.1: full configuration ≤ 194 kg (with boards installed in AC cabinets before delivery) • APM30H ≤ 87 kg (full configuration, excluding transmission equipment and storage batteries) • RFC ≤ 107 kg (full configuration) • In SRAN11.1 and later versions: ≤ 197 kg (with boards installed in AC

Item	Cabinet	Specifications
		cabinets before delivery) • APM30H ≤ 90 kg (full configuration, excluding transmission equipment and storage batteries) • RFC ≤ 107 kg (full configuration)
	BTS3900L (Ver.D) (DC)	• In SRAN8.0, SRAN9.0 and SRAN10.1: full configuration ≤ 235 kg (including two BBUs and 12 RFUs, but excluding transmission equipment) • SRAN11.1 and later versions: full configuration ≤ 241 kg (including two BBUs and 12 RFUs, but excluding transmission equipment)
	BTS3900L (Ver.D) (AC)	• In SRAN8.0, SRAN9.0 and SRAN10.1: full configuration ≤ 280 kg (including two BBUs, 12 RFUs, and AC power module, but excluding transmission equipment) • In SRAN11.1 and later versions: full configuration ≤ 286 kg (including two BBUs, 12 RFUs, and AC power module, nut excluding transmission equipment)
	BTS3900AL (Ver.A)	• In SRAN8.0, SRAN9.0 and SRAN10.1: full configuration ≤ 550 kg (including the base and fully configured batteries, but excluding transmission equipment) • In SRAN11.1 and later versions: full configuration ≤ 556 kg (including the base and fully configured batteries, but excluding transmission equipment)
	BTS3900C (Ver.C)	AC cabinet: full configuration ≤ 32 kg (excluding the BBU and RRU) DC cabinet: full configuration ≤

Item	Cabinet		Specifications
			28 kg (excluding the BBU and RRU)
	ILC29 (Ver.E)		≤ 80 kg (including the cabinet mechanical part, DCDU, fan box, and cable, but excluding the BBU5900 and transmission equipment)
	IMB05		8.7 kg (including only the IMB05 subrack, but excluding the BBU5900, power supply equipment, and cable)
Heat dissipation capability	BTS3900A (Ver.D)	APM30H (Ver.D) and TMC11H (Ver.D)	50ºC@1500 W
	BTS3900A (Ver.E)	APM30H (Ver.E) and TMC11H (Ver.E)	50ºC@1800 W
	BTS3900AL (Ver.A)		50ºC@2200 W
	BTS3900C (Ver.C)		50ºC@650 W
	ILC29 (Ver.E)		3600 W
	IMB05		1800 W

5.3 Environmental Specifications

NOTE

For details on the DBS3900 environmental specifications, see the product descriptions of BBUs, RRUs, and AAUs.

Table 5-3 Environmental specifications

Item	Specification	
Operating temperature	BTS3900 (Ver.D), BTS3900L (Ver.D), and ILC29 (Ver.E)	• –20°C to +55°C • +50°C to +55°C (short-term operation) **NOTE** Short-term operation indicates that a base station works for a maximum of 15 days within a year or that its continuous work duration is less than or equal to 72 hours.
	BTS3900A (Ver.D) and BTS3900A (Ver.E)	-40°C to +50°C with 1120 W/m² solar radiation. An AC heater assembly unit (HAU) is required if the operating temperature is below -20°C.
	BTS3900AL (Ver.A)	• With built-in batteries: –40°C to +40°C

Item	Specification	
		with 1120 W/m² solar radiation. An AC HAU is required if the operating temperature is below –20°C. • Without built-in batteries: –40°C to +50°C with 1120 W/m² solar radiation. An AC HAU is required if the operating temperature is below –20°C.
	BTS3900C (Ver.C)	–33°C to +50°C
	IMB05	• Side-mounted on a wall: –20ºC to +45ºC • Other installation modes: –20ºC to +50ºC
Relative humidity	BTS3900 (Ver.D), BTS3900L (Ver.D), and ILC29 (Ver.E)	5% RH to 95% RH
	BTS3900A (Ver.D), BTS3900A (Ver.E), BTS3900AL (Ver.A), and BTS3900C (Ver.C)	5% RH to 100% RH
Atmospheric pressure	70 kPa to 106 kPa	

5.4 Standards

Table 5-4 Standards

Item	Specifications	
Security standards	X.509	Supported in GBSS14.0, RAN14.0, eRAN3.0, SRAN7.0, and later versions
	• RFC 1825 • RFC 1826 • RFC 1827	
	RFC 4492	Supported in all versions
	RFC 5246	Supported in GBSS15.0, RAN15.0, eRAN6.0, SRAN8.0, and later versions
	Secure Socket Layer (SSL)	Supported in all versions
Ingress Protection Rating	BTS3900 (Ver.D), BTS3900L (Ver.D), and ILC29 (Ver.E)	IP20
	BTS3900A (Ver.D), BTS3900A (Ver.E), BTS3900AL (Ver.A), and	IP55

Item	Specifications	
	BTS3900C (Ver.C)	
Storage	ETSI EN300019-1-1 V2.1.4 (2003-04) class 1.2 "Weatherprotected, not temperature-controlled storage locations" **NOTE** • The validity period is one year. • The product can function properly within the validity period if the storage environment meets the preceding standards.	
Transportation	ETSI EN300019-1-2 V2.1.4 (2003-04) class 2.3 "Public transportation"	
Anti-seismic performance	• IEC 60068-2-57: Environmental testing - Part 2-57: Tests - Test Ff: Vibration - Time - history method • YD5083: Interim Provisions for Test of Anti-seismic Performances of Telecommunications Equipment (telecom industry standard in People's Republic of China)	
Anti-earthquake performance	DBS3900 (Ver.D), BTS3900A (Ver.D), BTS3900A (Ver.E), BTS3900AL (Ver.A), and BTS3900C (Ver.C)	ETSI EN 300019-1-4: "Earthquake"
	BTS3900 (Ver.D) and BTS3900L (Ver.D)	ETSI EN 300019-1-3: "Earthquake"
Electromagnetic compatibility (EMC)	3900 series base stations meet the electromagnetic compatibility (EMC) requirements and comply with the following standards: • R&TTE Directive 1999/5/EC • R&TTE Directive 89/336/EEC • ETSI EN 301489-1/8/23 • 3GPP TS 25.113 • ETSI EN 301908-1 • ITU-T SM 329-10 • FCC PART15	
	The GBTS meets the EMC requirements and complies with the following standards: • R&TTE Directive 1999/5/EC • R&TTE Directive 89/336/EEC • ETSI EN 301489-1/8 • ETSI EN 301908-1 • ITU-T SM 329-10 • FCC PART15	
	The NodeB meets the EMC requirements and complies with the following standards: • CISPR 22 (1997) • EN 55022 (1998)	

Item	Specifications
	• EN 301 489-23 V1.2.1 (2002-11) • CISPR 24 (1998) • IEC 61000-4-2 • IEC 61000-4-3 • IEC 61000-4-4 • IEC 61000-4-5 • IEC 61000-4-6 • IEC 61000-4-29 • GB 9254-1998 • ETSI 301 489-1 V1.3.1 (2001-09) • FCC Part 15 The NodeB has been certified by European standards.
	The eNodeB meets the EMC requirements and complies with the following standards: • R&TTE Directive 1999/5/EC • R&TTE Directive 89/336/EEC • 3GPP TS 36.113 • ETSI EN 301489-1/23 • ETSI EN 301908-1 V2.2.1 (2003-10) • ITU-R SM.329-10 The eNodeB has been certified by European standards.

6 Acronyms and Abbreviations

Table 6-1 Acronyms and abbreviations

Acronym and Abbreviation	Full Name
AC	alternating current
APM	advanced power module
AAU	active antenna unit
BAU 02D	battery alarm unit type 02D
BBU	baseband unit
CPRI	common public radio interface
CME	Configuration Management Express
Co-OAM	co-operation and maintenance
Co-RNP&RNO	co-radio network planning & radio network optimization
Co-RRM	co-radio resource management
Co-TRM	co-transmission management
CMUA	central monitoring unit type A
CMUE	central monitoring unit type E
CMUEA	central monitoring unit type EA
DC	direct current
DCDU	direct current distribution unit
EMC	electromagnetic compatibility
EMUA	environment monitoring unit type A
EPS	embedded power supply system
EPU	embedded power subrack unit

Acronym and Abbreviation	Full Name
ETSI	European Telecommunications Standards Institute
GSM	Global System for Mobile Communications
GUI	graphical user interface
HAU	heater assembly unit
HPMI	HERT power monitoring interface unit
IBBS	integrated battery backup system
IMS06	indoor mini subrack of 6 U height
LMT	local maintenance terminal
LTE	Long Term Evolution
MIMO	multiple-input multiple-output
OM	operation and maintenance
OMC	operation and maintenance center
PA	power amplifier
PSU	power supply unit
PMU	power monitoring unit
RF	radio frequency
RFC	radio frequency cabinet
RFU	radio frequency unit
RRU	remote radio unit
SDR	software-defined radio
SLPU	signal lightning protection unit
SMT	site maintenance terminal system
TCO	total cost of ownership
TEC	thermoelectric cooling unit
TMC	transmission cabinet
UMTS	Universal Mobile Telecommunications System
3GPP	Third Generation Partnership Project